U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-265 173

Guide to Land Cover and Use Classification Systems Employed by Western Governmental Agencies

Ecology Consultants, Inc, Fort Collins, Colo

Prepared for

Fish and Wildlife Service, Washington, D C Office of Biological Services

Mar 77

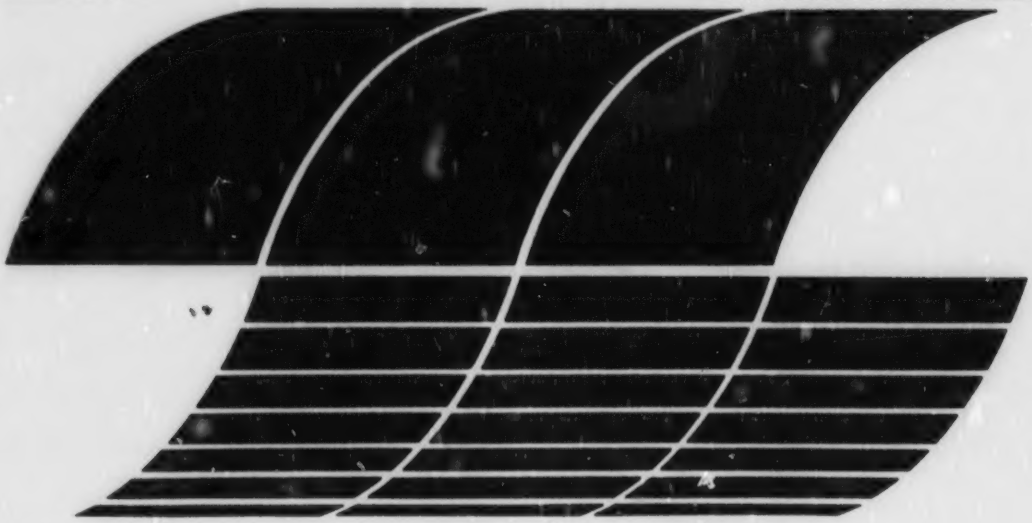
Biological Services Program

FWS/OBS-77/05
March 1977

PB 265 173

GUIDE TO LAND COVER AND USE CLASSIFICATION SYSTEMS EMPLOYED BY WESTERN GOVERNMENTAL AGENCIES

Interagency Energy-Environment Research and Development Program Report



Office of Research and Development
U.S. Environmental Protection Agency

Fish and Wildlife Service

U.S. Department of the Interior

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NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

BIBLIOGRAPHIC DATA SHEET	1. Report No. FWS/OBS-77/05	2.	3. Recipient's Accession No.

4. Title and Subtitle
Guide of Land Cover and Use Classification Systems Employed by Western Governmental Agencies

5. Report Date Published March 1977

6.

7. Author(s) Scott L. Ellis, Colling Fallat, Nancy Reece, and Carol Riordan

8. Performing Organization Rept. No. ECI-293

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P.O. Box 2105
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10. Project/Task/Work Unit No. WELUT No. 004.1-76

11. Contract/Grant No. 1416-0008-2123

12. Sponsoring Organization Name and Address
Western Energy and Land Use Team
Office of Biological Services
U.S. Fish and Wildlife Service
Rm. 206, Federal Bldg., Fort Collins, CO 80521

13. Type of Report & Period Covered
Final Report

14.

15. Supplementary Notes

16. Abstracts

This guide surveys and lists the classification systems in use by State and Federal agencies in 18 Western States and the Provinces of Alberta and Manitoba in Canada. The guide--limited primarily to wildlife, land use, and terrestrial vegetation--provides summary descriptions of classification systems, and the data base and the techniques required to implement these systems. System descriptions are divided into three sections: local systems, regional and multi-regional systems, plus some Canadian systems. Each system summary includes the title of the system, contact person, objectives, background, description, products and related systems. Author and keyword indexes and a glossary of terms are included.

17. Key Words and Document Analysis. 17a. Descriptors

ecosystem components
land types
land classification
data bases; data analysis techniques
land use
habitat-classification systems
vegetation-classification systems
wildlife habitat
mapping systems
habitat types

17b. Identifiers/Open-Ended Terms

Manitoba
Alberta
Canada
Western U.S.
Alaska
Arizona
California
Colorado
Idaho
Kansas
Montana
Nevada
New Mexico
North Dakota
Oregon
South Dakota
Texas
Utah
Washington
Wyoming

17c. COSATI Field/Group

18. Availability Statement
Release unlimited

19. Security Class (This Report) UNCLASSIFIED

20. Security Class (This Page) UNCLASSIFIED

21. No. of Pages 190

22. Price PC A09-MF A01

FORM NTIS-35 (REV. 10-73) ENDORSED BY ANSI AND UNESCO. THIS FORM MAY BE REPRODUCED USCOMM-DC 8265-P74

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2. To gather, analyze, and present information that will aid decision makers in the identification and resolution of problems associated with major land and water use changes.
3. To provide better ecological information and evaluation for Department of the Interior development programs, such as those relating to energy development.

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FWS/OBS-77/05
March 1977

GUIDE TO LAND COVER AND USE CLASSIFICATION SYSTEMS EMPLOYED BY WESTERN GOVERNMENTAL AGENCIES

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This study was conducted
as part of the Federal
Interagency Energy/Environmental
Research and Development Program
U.S. Environmental Protection Agency

Performed for

Western Energy and Land Use Team
Office of Biological Services
Fish and Wildlife Service
U.S. DEPARTMENT OF THE INTERIOR

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PREFACE

The U.S. Fish and Wildlife Service Office of Biological Services, Western Energy and Land Use Team contracted with Ecology Consultants, Incorporated to conduct a survey and compile a list and associated descriptions of existing systems in use by state and federal agencies in 18 western states and two provinces in Canada. Information gathered in this survey will be incorporated in future FWS wildlife habitat assessment programs.

Agencies contacted in this survey responded to inquiries regarding their scheme of classification by providing information on methods of organizing or grouping data acquired to meet their particular needs or responsibilities. Documentation received from agencies included inventory categories, capability or suitability ratings, and classification systems with definitions of classification categories. On the basis of material assembled, a user's guide was developed which provides the objectives and descriptions of the systems surveyed.

Initial efforts involved compilation of a list of all candidate agencies which could be expected to use classification systems. Federal and state governmental directories and the 1976 National Audubon Conservation Directory provided many prospective contacts. The following steps were implemented to gather and organize information about classification systems. A telephone questionnaire was designed to elicit pertinent information on systems utilized or proposed within the agency. An abstract of each conversation was prepared at the completion of each telephone call. A request was made for any available documentary material so that the system could be more adequately described.

Information received over the phone and through the mail was then compiled into a brief summary description designed to characterize the nature of the system according to certain criteria outlined in the User's Introduction. Upon completion, the summary was sent back to the original contact for review and further comment. This final review process was conducted for the great majority of the systems, although time did not permit review of all of them. Almost all original respondents (80%) critiqued and returned the summary sent to them.

USER'S INTRODUCTION

The intended audience for this guide are individuals who have land use planning and management responsibilities and who may wish to examine existing classification systems in use in the western states and a portion of Canada to assist them in developing a structure for organizing natural resource data. The format of this guide is designed to provide the user with summary descriptions of classification systems within various planning or management fields of interest, and the data base and techniques required to implement the classification system. This guide is limited primarily to wildlife, land use, and vegetation (terrestrial) classification systems. Although several stream and wetlands classification systems are included here, a detailed search for aquatic classification systems was not attempted. Included is a cross reference to products available by geographic area for the various systems (see Geographic Application Index).

One of the conclusions reached during this survey was that research into the classification of land is currently very active, and a number of individuals are developing classification systems to meet specific needs. An attempt has been made in the system descriptions to indicate whether a system is currently under development, and the extent to which it has been applied. Some respondents to the telephone interviews indicated that they were developing a classification system, but documentation of these efforts was not currently available. These preliminary classification systems were not included in this guide unless some written documentation indicated an on-going effort was provided.

Format

For presentation of the material collected in this survey, the system descriptions are divided into three sections. Section I lists regional and multi-regional systems; Section II lists sub-regional systems; and Section III lists Canadian systems. Section I systems represent classification schemes with a well-defined and well-documented structure which permit an integrated application of the system at a multi-regional or regional level. Systems in Section I are listed under major U.S. departments. Each system is assigned a three digit code number beginning with zero (e.g. 001, 002, etc.).

Section II systems consist largely of those used by state agencies for the purposes of land use planning and management, and have a more limited geographic scope of implementation than those systems included in Section I. These systems represent methods of aggregating information which have generally been developed to structure local, specific data obtained during the course of resource inventories and assessments. Also included in this section are descriptions of documents which have limited information in terms of classification criteria, but may access valuable inventory data useful to land use planners with responsibilities for specific areas within the western states. Systems in Section II are arranged by state, and each state included in this survey is assigned a three or four digit code number beginning with the rank that the state holds in an alphabetical listing (e.g. Alaska 100, Arizona 200, California 300, etc.).

Section III contains descriptions of several federal and provincial classification systems from agencies in the provinces or Manitoba and Alberta in Canada. Each system in Section III is assigned a four digit number beginning with nine (e.g. 9001, 9002, etc.).

System Summaries

Each system description in the guide begins with the Title of the system. The title represents the name of the system as it is commonly known. A title in parenthesis represents a synthetic title abstracted from the document describing the system. The system name is followed by a reference to documentation of the system. In addition, the agency Contact utilizing the system is cited, and, if applicable, the name of an individual in the agency responsible for developing or maintaining the system. In order to aid the reader in determining the purpose of a particular system, a short statement summarizing the Objectives of the system is presented.

The narrative description of each system consists of a discussion of the Background of the system, which may include the stage of system development (length of application), authorization for its development and implementation, and philosophical antecedents. The main body of the Description outlines the system nomenclature, and structure. When possible, information is provided on the data bases required to implement the classification system, and Products which have been produced in accordance with the system. Related Systems are cross-referenced for further background and descriptions where appropriate.

Direct quotations or original ideas, taken from the documentation of the system, are footnoted at the end of a system description. Other material referenced by authors or users of the system and relevant to the nomenclature, development, or procedure of the system is cited by author and date in the text with complete citations listed in the Literature Cited at the back of the guide.

The amount of information available for a particular system was frequently limited by the information available in telephone contacts or by the quantity of information that agencies were able to send by mail. In some cases manuals describing a system had not yet been prepared. All agencies contacted were very cooperative and willingly sent requested information. Direct contact with the agencies listed can result in further explanation of the systems described.

Keyword Indexes

System descriptions are indexed in a Keyword Index at the end of the guide on the basis of their applicability to one or several different subject areas. Users can choose the subject areas listed below in combination with the geographic area of interest to determine quickly whether a system is described which will fit all or part of his or her needs. These subject areas are as follows:

1. Ecosystem components. Nearly all systems that involved classification of the natural landscape relied on the characteristics of one or several ecosystem components such as soils, vegetation, land forms, or climate to segregate different elements in the system. Since vegetation

is an accepted expression of other components such as physiography, soils, and climate, and is an expedient component to map from remote sensing data, it is often the central classifying component. Large-scale systems such as the Ecoclass system of the U.S. Forest Service (003), the Integrated Habitat Analysis of the Bureau of Land Management (007), and the Interim Wetlands Classification system of the U.S. Fish and Wildlife Service (009), utilize several ecosystem components independently or in combination at different levels within their system. Some systems classified employ only one or two components, such as the California Soil and Vegetation Survey (001).

Keywords applicable to this subject area include: soils, vegetation, wildlife, land forms.

2. Land types. Many classification systems are designed to classify different types of land according to existing or potential uses. The responsibilities of a particular agency frequently define the types of land it needs to classify. State land use planning agencies may be interested in classifying all types of land, both natural and cultural (e.g. Colorado Land Use Classification System (403)). Other agencies may have responsibilities for a particular resource (e.g. timber occurring on state lands), and the resulting classification system classifies characteristics of this particular resource. The keyword indexing attempts to account for these different levels which have particular management objectives associated with them (e.g. forests, rangeland, wetlands, agriculture, urban, mountains, land use/land cover).

3. Land capability. Some systems referenced are organized around the concept of land potential or suitability for a specific purpose. Examples include the Soil Conservation Service Land Capability Classification (005) which classifies soils for agricultural suitability, and the Bureau of Reclamation Irrigation Suitability Classification (014) which classifies sites on the basis of suitability for irrigation. Other examples include agencies with requirements to rate land for specific human uses such as the Bureau of Outdoor Recreation Uniform Recreation Supply Classification Proposed;(012).

Systems are indexed under land capability or recreation use only if the nomenclature of the system implies a rating or capability interpretation by the user.

4. Data bases and analysis techniques. The structure of remote sensing systems encountered during this survey are predicated on the use of different scales of aerial and satellite photography to define different classification levels within the system (e.g. Anderson et al. (017)). Other systems are predicated on compatibility with computer storage and analysis systems, and the classification categories are influenced by this requirement (e.g. GRIDs, Oregon Department of Natural Resources, 1501). When possible, the data bases required for system implementation are indicated in the system description text, and indexed accordingly.

Geographic Application Index

A Geographic Application Index is included at the end of the guide to assist users in relating application, or products of the various systems to specific geographical locations.

Author Index

The author index includes entries for all systems where authors are cited.

Glossary

A glossary is provided to define key ecological, classification, and land management terms used in the text of the system summaries. These definitions were generally derived from standard ecological references, or represent interpretations of a term (e.g. habitat type) when such terms are used outside the context of a specific system. Detailed definitions of terms applicable to particular systems of classification were generally provided by the system's authors in the system documentation. Authors' specific definitions were included in system summaries whenever possible.

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SECTION I

MULTIREGIONAL AND REGIONAL SYSTEMS

Title

Forest-Range Environmental Study

"The Nations's Range Resources, A Forest-Range Environmental Study," USDA Forest Service, Forest Resource Report No. 19, December, 1972.

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Objective

To assemble information about all of the Nation's rangeland and to develop a technology for its evaluation that would serve the planning needs of the Forest Service.

Background

The Forest-Range Environmental Study (FRES) was a major agency effort. A Forest-Range Task Force consisting of representatives from each of the three major Forest Service program areas - National Forest System, State and Private Forestry, and Research - conducted the study. The necessary capability for systems and computer analysis was developed under a cooperative program with the Economic Research Service of the USDA and the University of Nebraska Computing Center. The above referenced document is one of four reports that present the concepts, procedures, information, and analyses developed in FRES, 1970-72.

The FRES System was modified in 1976 and combined with Ecoregions (004) for use nationally as the base for resource assessment reporting to the Congress in 1979 as required by the Resource Planning Act of 1974.

Description

A system was developed for categorizing the forest and range area of the 48 conterminous states into major ecosystems. These ecosystems were divided according to ownership, productivity, and condition into 956 resource units. Output and demand were estimated and an analytical system was developed to suggest cost effective management.

The ecosystem classification (based on soil-vegetation units) was adapte from the work of Kuchler (1964; 015), who classified the conterminous U. S. int 106 major plant communities (phytocenoses) based on potential natural vegetatio that would exist if man were removed from the scente and the resulting plant succession telescoped into a single moment. Two major modifications were made to the Kuchler classification to form 34 ecosystems 1) closely related Kuchler units were combined and 2) USDA Forest Service's forest survey types were included. Ecosystems are grouped into four Ecogroups: Western Forest, Great Plains, Western Range, and Eastern Forest. A brief description of each ecosystem and correlation of the ecosystems with Kuchler's classes is included in an appendix to the above referenced document.

Within each ecosystem delineation, the land areas were further subdivided so that data could be analyzed on a production and condition class basis. For range ecosystems, productivity classes were expressed in terms of herbage production; condition classes were based on vegetation cover, composition, vigor, and soil factors in relation to climax situations. Forest ecosystem productivity and condition were expressed in terms of volume of wood produced and timber size class. Three ownership classes were specified. To simplify data compilations, the forest and woodland ecosystems were made synonymous with broad geographic forest types as defined by the U.S. Forest Service in 1967 (USDA Forest Service 1974).

All land based data were taken from existing inventories. (Sources are described in the referenced report). Vegetation units of other land inventory systems and the communities established by Küchler were coordinated where possible. Acreages were compiled by resource unit, ownership, state, and one of the four geographic regions (Western, Plains, Northeast, Southeast). Management strategies and objectives, analytical concepts and procedures, and alternatives are outlined in the report.

Products

The referenced report is the basic document out of four reports resulting from the FRES study. The three supporting reports include: "Forest-Range Environmental Production Analytical Systems (FREPAS). 1972;" "Vegetation and Environmental Features of Forest and Range Ecosystems;" and "Range Management Practices: Investment Costs, 1970."

One of the three reports supporting "The Nation's Range Resources - A Forest-Range Environmental Study" is Agriculture Handbook 475 (USDA Forest Service 1974). Handbook 475 presents the system used to classify all the land area of the 48 contiguous states into 34 soil-vegetation units and provides a description of each.
Each description contains brief sections on physiography, climate, vegetation, fauna, soils, and land use. The descriptions may include information on herbage and browse production. Subunits of the ecosystems, called resources classes, served as the land units for which 1970 yields of 22 products from forest and range lands were estimated.

A description of Classification of Productivity and Condition and an Index to FRES Ecosystems and the Küchler System Equivalents are included in Handbook 475.

Related Systems

Potential Natural Vegetation--Küchler (017).

Title

(Land Systems Inventory)

"Land System Inventory Guide," USDA Forest Service, Northern Region.
"Land Systems Inventory, Boise National Forest, Idaho: A Basic Inventory for Planning and Management," by George E. Wendt, Richard A. Thompson, and Kermit N. Larson. USDA Forest Service, Intermountain Region, June 1975.

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Objective

To provide a system of different levels of inventory whereby large tracts of land can be inventoried rapidly for a broad overview or for detailed planning to provide basic information for management decisions regarding allocations and uses of the National Forest lands.

Background

The land systems technique, or variations of it, are presently used in all National Forest Regions to provide land base information for integrated environmental studies. The system is designed to meet specific land use planning objectives and relate to all other resource systems of land classification.[1] Land use planning is accomplished on several levels of resolution. A primary objective of the system is to present data in a clear, understandable manner to which users can relate.

The soils staff of the Intermountain Region was responsible for developing the land systems procedure over a period of years. The system was first described in a publication entitled "Land Systems Inventory" (Wertz and Arnold 1972). The revision by Wendt et al. (1975) as referenced above is designed to demonstrate how the basic information can be used in land use planning. The system is open for future revision. A publication refining the procedures and methodology employed for identifying and mapping the system is under development.

Description

"The land system inventory is a hierarchical system of land classification containing seven categories. In the first three categories, (province, section and subsection), the classes are defined by climatic and geologic properties of soils, landforms and climax plant communities. Each of the categories provides land resource data at a level of generalization appropriate for specific planning needs. The classes in each category can be subdivided to provide more specific data at a lower categorical level or aggregated to provide more general data at a higher categorical level."[2]

Province delineates regional differences by topographic patterns and climates as expressed by broad vegetative patterns. Mapping scale is 1:1,000,000 or larger. A province generally covers an area of 1,000 or more square miles. Information at this level is useful for nationwide data summar

Section delineates differences by topographic expression and vegetation, climate, and soil development patterns. Mapping scale is 1:500,000 t 1:1,000,000. Size of a section ranges from 100 to 1,000 square miles. National and regional planning and data summary information is provided by inventory of this level.

Subsection delineates major components of sections. Mapping scale is 1:250,000 - 1:500,000. A subsection covers an area of 25 to 100 square miles. Information obtained on this level is applicable to regional and subregional planning and data summary.

Land type association delineates areas in similar stages of development which reflect hazards and/or capabilities. Mapping scale is 1:60,000 - 1:125,000. Size of a landtype association ranges from 1 to 25 square miles. Information from this level is useful for data summary for allocation of resources; it is most commonly used for land use planning at the National Forest level.

Landtype delineates the permanent elements of the ecosystem that have predictable behavior patterns. Mapping scale is 1:30,000 - 1:60,000. A landtype covers an area of 1/10 to 2 square miles. Comprehensive planning offices employ this information.

Landtype phase delineates individual components of landtypes. Mapping scale is 1:15,000 - 1:30,000. The size of a landtype phase is 1/100 to 1/10 square miles. Information compiled on this level is useful for project development and detailed planning.[3]

"The theoretical basis for land system inventory is that landforms, patterns of soils, and climax plant communities are all products of the interaction of climatic forces with the geologic structure of the earth's surface. This system of classification integrates the sciences of geomorphology, geology, soil science, hydrology and plant ecology to classify, map and describe various kinds of lands."[4]

"Basic Land Systems units such as landtype associations can be grouped to reflect management opportunities and constraints and individual management direction for planning purposes. This method aggregates the landtype association into land capability groups. The groups are areas of land having similar characteristics, suitabilities, potentials, and response to use. This basic information can be used in making meaningful management decisions. As an example, lands having an inherently high productivity potential for timber and few roading hazards can be identified as presenting the best opportunity for full coordinated timber management activities with maximum return for dollars invested."[5]

"Capability groups can be developed for any level in the Land Systems Inventory. Groups of landtype associations are suited to forestwide land use and broad resource planning. For specific needs more refined capability groupings of landtype phases can be grouped to evaluate soil habitat type correlation or slope stability."[6]

Products

Products include inventories conducted on various National Forest lands which determine location and extent of capability group and landtype or landtype associations identified within the study area. Contact U. S. Forest Service Regional and District Offices for existing products in a specific area.

Related Systems

Ecoregions (004).

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[1] USDA Forest Service, Northern Region, "Land System Inventory Guide', p.1.

[2] Ibid, p.4.

[3] G. E. Wendt, R. A. Thompson, and K. N. Larson, "Land Systems Inventory", USDA Forest Service Intermountain Region, 1975, p.4-5.

[4] USDA Forest Service, Northern Region, p. 4.

[5] Wendt, et al., 1975, p.44.

[6] Ibid, p. 44.

Title

Ecoclass

"Pacific Northwest Ecoclass Identification: Concepts and Codes", by Frederick C. Hall, Principal Plant Ecologist, USDA Forest Service, Pacific Northwest Region, R 6 Regional Guide 1 - 3, January 1976.

Contact

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RM Unit
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Objective

To provide a system of identification for use by land managers in identifying and mapping vegetation resources and their characteristics.

Background

Dr. Hall states that, "Nomenclature used in identification should provide for: (1) Flexibility. (2) Comprehensive description of the community or item. (3) Identification of stable or climax type rather than rapidly changing successional conditions. . . (4) A means for aggregating similar plant communities or items together (a kind of classification system) to meet needs of the land manager. (5) Computer capability. (6) As much direct interpretability as possible (coding that can mean something to the reader)".[1] The Ecoclass system was developed with the above criteria in mind. A discussion of the philosophical basis of classification and identification systems is provided in Hall (1976b).

Description

Ecoclass is an alphanumeric identification system for use in identifying and mapping basic vegetation resources and their characteristics. It is designed for computer storage and retrieval of information and therefore provides for the aggregation of information at a particular level desired by the land manager. The Ecoclass Identifiers consist of three 2-digit codes representing four levels of information: Formation Association, Series, and Community/Habitat Type. The fourth level of Ecoclass can be either Community Type or Habitat Type. "A Habitat Type is defined as a climax plant community which is in balance with its soil, climate, and topographic location." "A Community Type is neither restricted to climax vegetation nor is it limited in description to vegetation. It is defined as a soil-vegetation 'type' which is significantly different in its management characteristics from other kinds of soil-vegetation 'types'."[2] When possible, the 2-digit Community Type Code is divided into a primary "family" of Community Types (1st digit) and a specific kind of Community Type (2nd digit).

Ecoclass is described as an open-ended system. Additions can be made to the 11 Formations, 67 Associations, 550 Series, and 210 Community Types. Ecoclass also provides for "special" groupings at the Series level.

The Ecoclass Identification System is designed for compatibility with the Total Resource Information System (TRI System), U.S. Forest Service, Region 6. The Ecoclass Identifiers can also index mathematical models of ecosystems which are mainly related to the Community Type/Habitat Type level (e.g. productivity, reaction to management, etc.).

Ecoclass codes are updated in January of each year. It is anticipated that the next update of Ecoclass will involve a complete change in the aquatic system. The U.S. Fish and Wildlife Wetlands System with modifications will be adopted.

Products

The above-referenced publication lists the codes for Pacific Northwest Ecoclass identification, provides an explanation of Ecoclass identification principles, and provides a diagrammatical description of the relationship among the four levels of Ecoclass.

An example of the application of Ecoclass principles is Volland (1976), which identifies the plant communities within the zone and provides a dichotomous vegetation-site key for field identification. The guide was prepared using the principles outlined in Hall (1970). Some of the Ecoclass codes for Community Types which identify ecological units are described in this Guide.

Further information on Ecoclass can be obtained from Dr. Frederick C. Hall, USDA Forest Service, Portland, Oregon.

Related Systems

Modified Ecoclass (1202), Forest Vegetation (1603).

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[1] F.C. Hall, "Pacific Northwest Ecoclass Identification: Concepts and Codes," USDA Forest Service, Pacific Northwest Region, R-6 Regional Guide 1-3, 1976a. p. 1.

[2] Ibid, p. 10.

Title

Ecoregions of the United States

"Ecoregions of the United States" by Robert G. Bailey (Map), USDA Forest Service prepared in cooperation with U.S. Fish and Wildlife Service, 1976.

Contact

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Objective

To provide a basis for organizing and interpreting a census of rangeland and forest resources for the nation.

Background

"Ecoregions of the United States" is designed to reconcile the biotic and abiotic classifications of the country into a single, relatively objective, geographical classification. The map is intended to be an experiment in classifying the major ecologic divisions of the country. Regionalization, the process of grouping objects on the basis of spatial relationships rather than on taxonomic properties, reduces the variation in the environment to a manageable level. The system is designed to allow for aggregation of data at different levels to satisfy decision-making needs at regional, state, and national levels and to provide an integrating frame of reference needed to fully interpret the detailed data.

Description

The scheme is a general purpose classification largely adapted from Crowley (1967) and from Wertz and Arnold (1972). Geographical distribution of ecoregions is correlated with climatic types, physiographic provinces, and agricultural regions (Atwood 1940) and with soil types (Soil Survey Staff 1970). The climatic map of the world, modified from the Köppen classification by Trewartha (1943) at a scale of 1:75,000,000, and the climatic map of North America by Thornthwaite (1931) at a scale of 1:20,000,000 were used with some modification to identify climatic domains and divisions. Küchler's map of "Potential Natural

Vegetation" at a scale of 1:3,168,000 (Küchler 1964) was among the sources generalized and modified to delineate provinces and sections.

The resultant map, not intended as a final classification, is on a scale of 1:7,500,000. The map includes a written description of purpose, principles of ecosystem regionalization, development of the map, applications and refinements, and an explanation of the ecoregions. A separate text describing in detail the methodology and units is in preparation.

The classification scheme is based on a major division of all lands into lowlands and highlands. Upper rungs of the hierarchy are determined by bioclimatic criteria, whereas the lower levels are largely determined by geologic and geomorphic criteria. Only the upper levels are delineated in the map. Each region is named after the most obvious vegetation indicator (e.g. mixed forest, broadleaf forest, desert). Designations of geographic situations such as Eastern Deciduous Forest and California Grassland are added.

This integrated system has four levels of generalization: domain, division, province, and section. A domain represents a subcontinental area of broad climatic similarity: for example, lands with the dry (B) climates of Köppen (Trewartha 1943) or Thornthwaite (1931). There are four domains: polar, humid temperate, dry, and humid tropical. Division is a subdivision of a domain representing isolated areas of differing vegetation and regional climates basically at the level of the climatic types of Köppen. Parameters used to differentiate between domains and divisions include temperature, rainfall, vegetation, and soil. Province is a subdivision corresponding to a broad vegetation region with a uniform regional climate and the same type of zonal soils. Two or more climates may be represented within a single province, although in general a single climate association characterizes each province. Highland eco-regions such as mountains, plateaus, and high-elevation plains in which altitudinal zonation is high are considered separate provinces, and are classified according to the climatic regime of their respective lowland. The lowest rung of the hierarchy is the section, a subdivision of a province based on local climatic variation. A single climatic association determines the section. The principal indicator of a section is variation in potential vegetation as mapped by Küchler (1964). Ecosystems below the level of section were not included on the map.

Products

"Ecoregions of the United States", a 1:7,500,000 scale map, is available upon request. The publication describing the methodology and units will be forthcoming from the USDA Forest Service.

Title:

Land Capability Classification

"Land Capability Classification", by A.A. Klingebiel and P.H. Montgomery, Agricultural Handbook No. 210, USDA Soil Conservation Service, September 1961.

Contact:

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Objective

To provide soils capability information to users; to make passable broad generalizations based on soil potentialities, limitations in use, and management problems.

Background

Since its establishment in 1935 the USDA Soil Conservation Service has devised a number of different soil capability classification systems. The system presently in use is described in the Agricultural Handbook No. 210, "Land Capability Classification". Other agencies and planning groups use modified versions of the SCS system or use the system in conjunction with other classification schemes.

Description

"Capability classification is the grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible but unlikely major reclamation projects.

"Soils already irrigated are classed according to the continuing soil and climatic limitations that affect their use under irrigation.

Irrigation water of ample quality and quantity is assumed is classifying soils."[1]

The capability classification is comprised of three major levels of soil groupings: capability unit, capability subclass, and capability class. Soils are grouped primarily on the basis of their capability to support common cultivated crops and pasture plants over a sustained period of time without deterioration.

"The category of highest resolution, the capability unit, is a grouping of soils that have about the same responses to systems of management of common cultivated crops and pasture plants. Soils in any one capability unit are adapted to the same kinds of common cultivated and pasture plants and require similar alternative systems of management for these crops.

"The second category, the subclass, is a grouping of capability units having similar kinds of limitations and hazards. Four general kinds of limitations or hazards are recognized: 1) erosion hazard, 2) wetness, 3) rooting zone limitations, and 4) climate.

"The third and broadest category in the capability classification places all the soils in eight capability classes. The risks of soil damage or limitation in use become progressively greater from class I to Class VIII. Soils in the first four classes under good management are capable of producing adapted plants, such as forest trees or range plants, and the common cultivated field crops and pasture plants. Soils in classes V, VI, and VII are suited to the use of adapted native plants. Some soils in classes V and VI are also capable of producing specialized crops, such as certain fruits and ornamentals, and even field and vegetable crops under highly intensive management involving elaborate practices for soil and water conservation. Soils in class VIII do not return on-site benefits for inputs of management for crops, grasses, or trees without major reclamation."[2]

Other kinds of interpretive soil groupings such as ones for range use, woodland use, special crops, and engineering interpretation are necessary to meet particular needs.

"Soil and climatic limitations in relation to the use, management, and productivity of soils are the bases for differentiating capability classes. Classes are based on both degree and number of limitations affecting kind of use, risks of soil damage if mismanaged, needs for soil management, and risks of crop failure."[3]

"Capability groupings are based on specific information when available - information about the responses of the individual kinds of soil to management and the combined effect of climate and soil on the crops grown. It comes from research findings, field trials, and experiences of farmers and other agricultural workers. Among the more common kinds of information obtained are soil and water losses, kinds and amounts of plants that can be grown, weather conditions as they affect plants, and the effect of different kinds and levels of management on plant response. This information is studied along with laboratory data on soil profiles. Careful analysis of this information proves useful not only in determining the capability of these individual kinds of soil but also in making predictions about the use and management of related kinds of soil."[4]

In addition to the land capability classification, the SCS also has a land use classification outlined in section 710.4 of the SCS Resource Conservation Planning Handbook of July 1, 1970. Land use is divided into 14 categories. Terms may vary according to the preference of the decisionmaker.

The categories are as follows: commercial/industrial land, community services land, cropland, farmstead or headquarters, hayland, native pasture, pastureland, rangeland, recreation land, residential land, transportation services land, wildlife land, woodland, and other land.

Products

Products of these classifications include soil survey maps, state conservation needs inventories, and other publications and information regarding soil capability. Contact the State Resource Conservationist for availability of products in specific localities.

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[1] USDA Soil Conservation Service, Colorado State Board, Colorado Association of Soil Conservation Districts, "Colorado Needs Inventory", December 1969, p. 110.

[2] A.A. Klingbeiel and P.H. Montgomery, "Land Capability Classification", Agricultural Handbook No. 210, USDA Soil Conservation Service, p. 3.

[3] Ibid, p.13.

[4] Ibid, p.13.

Title

(Land Resource Regions)

"Land Resource Regions and Major Land Resource Areas of the United States", USDA Soil Conservation Service, Agriculture Handbook 296, December 1965.

Contact

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Box 2007
Albuquerque, New Mexico 87103
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Objective

To assemble and organize currently available information about the land as a resource for farming, ranching, forestry, engineering, recreation, and other uses.

Background

This publication and map are the results of the Soil Conservation Service efforts to assemble and organize information about the land as a resource for farming, ranching, recreation, and other uses. The map included with the referenced publication is an update of the 1950 map "Problem Areas in Soil Conservation". Further revision of the map and report is planned as additional information becomes available.

Description

In the preparation of land resource maps on state and national levels, three land resource categories have evolved.

1. Land resource units are geographic areas of land, usually several thousand acres in extent, that are characterized by particular patterns of soil (including slope and erosion), climate, water resources, land use, and type of farming. Land resource units are the basic map units on State land resource maps, which are usually at the scale of 1:1,000,000. These units are not described in the handbook or shown on the map but are basic units from which the major land resource areas have been determined.[1]

2. Major land resource areas consist of geographically associated land resource units. Identification of these large areas is most important in state-wide agricultural planning and has value in inter-state, regional, and national planning. At a scale of 1:1,000,000 a map of a state of ordinary size and complexity shows between 6 and 12 land resource areas.[2]

3. Land resource regions consist of geographically associated major land resource areas most significant for national planning.[3]

The grouping of land resources into categories in each of the three major categories is intended to preserve as much uniformity as possible in relationships significant to agriculture.

Descriptions are provided for the land resource regions and the 156 major land resource areas. The dominant physical characteristics of each land resource region are briefly described by 1) land use, 2) elevation and topography, 3) climate, 4) water and 5) soil.[4]

Products

A map entitled Land Resource Regions and Major Land Resource Areas of the United States, exclusive of Hawaii and Alaska, at a scale of 1:10,000,000 included with the publication.

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[1] USDA Soil Conservation Service, "Land Resource Regions and Major Land Resource Areas of the United States", Agriculture Handbook 296, December, 1965. p. 1.

[2] Ibid p. 1.

[3] Ibid p. 1.

[4] Ibid p. 1.

Title

(Rangeland Inventories)

"National Range Handbook", USDA Soil Conservation Service, July 13, 1976.

Contact

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Objective

To outline SCS policy and procedures for assisting government and private sectors in planning and applying resource conservation programs on rangeland and other native grazing land.

Background

The National Range Handbook supersedes and replaces the Handbook for Range and Related Grazing Lands, July 1967. The Handbook supplements the procedures of the SCS as outlined in A Framework Plan; Soil and Water Conservation for a Better America, and the National Handbook for Resource Conservation Planning. SCS authority, policy, and procedures for range conservation activities are described in the handbook.

Description

Native grazing land is defined by the SCS as "land used primarily for production of native forage plants maintained or manipulated primarily through grazing management. Native grazing land includes rangeland, grazable woodland, and native pasture..."[1] The National Rangeland Handbook provides guidelines for inventory of native grazing land.

Range sites are the basic components used by the SCS for rangeland inventory. A range site is defined as, "a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community."[2] Range site maps provide the basic ecological information for managing rangeland.

A range site is identified and described by the climax plant community it is capable of supporting. The climax plant community is defined as the natural plant community of a range site in the absence of abnormal disturbances and physical site deterioration, or that plant community which is in dynamic equilibrium with the environment.[3]

The handbook outlines a method for determining the climax plant community of a range site, mapping range sites from field data, and determining range condition and trends.

In addition to the description of range site inventories, the National Range Handbook provides similar specific information on grazable woodland resources and inventories and native pasture resources and inventories. A Range Data System (RDS - automated system for storage, retrieval, and analysis of data on productivity, and species composition for native grazing land) is described. Other chapters of the Handbook outline methods for determining approximate production and species composition, correlating livestock management and grazing resources, planning wildlife habitat management on native grazing land, managing plant communities, evaluating cost-return, and conservation planning.

Products

Copies of the National Range Handbook may be obtained by contacting the State Resource Conservationist, Soil Conservation Service.

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[1] USDA Soil Conservation Service, "National Range Handbook", July 13, 1976, (unpaginated).

[2] Ibid.

[3] Ibid.

Title

(Range Sites and Soils)

"Range Sites and Soils in the United States", by Thomas N. Shiflet, USDA Soil Conservation Service, Washington, D.C., 1973.

Contact

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Objective

To identify range sites and condition for purposes of investigation, evaluation, and management of rangeland.

Background

The system of rangeland classification used by the Soil Conservation Service is described in the above referenced article taken from Arid Shrublands - Proceedings of the Third Workshop of the United States/Australia Rangelands Panel, Tucson, Arizona, March 26-April 5, 1973. Concepts of range site and range condition are reviewed and a discussion of range site identification and use is provided.

Description

The Soil Conservation Service defines range site as "a distinctive kind of rangeland which differs from other kinds of rangeland in its ability to produce a characteristic natural plant community."[1] The major factors contributing to the development of a distinctive climax plant community are climate, soils, and topography. Sites are identified by evaluating and describing the distinctive plant communities. Distinctive differences between sites are generally determined by differences in species composition or productivity or both which require different management practices.

Currently, the definition of range condition used by the SCS in all range inventory activities is "the present state of vegetation of a range site in relation to the climax plant community for that site."[2] Four range condition classes as described by Renner (1948) used in SCS field activities are: 1) excellent - more than 75% of the original vegetation 2) good - 51-75% of the original vegetation 3) fair - 26-50% of the original vegetation 4) poor - less than 26% of the original vegetation.

Range site expresses capability or potential and range condition indicates the status of the present plant community in relation to that potential. The major use of range site and condition is to provide an inventory for range management purposes.

Primary source of information on plant communities in the SCS is from productivity and composition data collected in the field over many years and from special studies. Collection of all plant community data in the SCS is stratified on the basis of soil series and phase. Soils information plays the major role in extending existing data to similar environmental situations and to points along environmental gradients where data are not available. Climate and topography, in addition to soils, must be considered to properly interpolate existing plant community data to areas where no data are available.

An example of how plant community data can be used to arrive at range site groupings is provided in the referenced article. Average productivity and gross structure of the plant community from one soil are compared with similar data from other soils. Those found to be similar in productivity and composition are grouped into the same range site. An illustration of how a range site and condition inventory might be recorded on a map is also provided in the article.

Range site and condition are useful in evaluating and managing rangeland for livestock, wildlife, watershed, and other beneficial uses.

Products

Range Site Descriptions for soils (e.g. Loamy plains) and land resource areas are available through SCS field offices. The descriptions include information on physiographic features, climate, native vegetation, annual production, soils, endangered species, and location, and major uses and interpretations.

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[1] T.N. Shiflet, "Range Sites and Soils in the United States", USDA Soil Conservation Service, Washington, D.C., 1973, p. 26.

[2] Ibid, p. 27.

Title

Integrated Habitat Analysis (proposed).

"Integrated Habitat Analysis," by USDI Bureau of Land Management, May 3, 1976 (draft manual).

Contact

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Denver, Colorado 80225

Objective

To classify all lands according to a common system for wildlife and land mangement purposes; to provide standardized data elements for the description and comparison of ecosystems; to provide a standard data gathering format for planning and impact assessment efforts.

Background

The current draft manual for Integrated Habitat Analysis was developed in response to recent legislation which required land management agencies to conserve nongame as well as game wildlife species. These expanded responsibilities required a more extensive data base, and a classification system to structure these data. No predecessor to the current system is cited in the draft document. The draft manual includes definitions of all classification levels, and decision criteria for separating units within levels. This system is multilevel, with use intended at both the regional and at the local (district land manager) level. Review of the draft at state and district is currently taking place, and state lists of habitat types are being developed (see below).

Description

Although the intent of this system is to classify wildlife habitat, the authors of the system acknowledge that wildlife habitat is best described by vegetation, land form, and climatic criteria due to the inherent difficulties of describing animal distributions which may be highly variable in time and space. The classification approach consists of a nested series of ecosystems ranging from those that are continental in scope (Biome) to local field ecosystems (Habitat Sites). Ecosystems in this context consist of "geographically definable systems of interrelating biotic (vegetal and zoological) and abiotic (climate, soils, land forms, etc.) components which exist at numerous hierarchical levels are characterized by increasing homogeneity at progressively lower levels of the hierarchy."[1] Both biotic and abiotic components are selected to define different levels of the system. Criteria for determining level characteristics are developed from works on regional classification at the higher levels, and from field worker experience at the lower levels.

Classification levels in the Integrated Habitat Analysis System consist of the following levels, ranked from most general to most specific. The manual provides definitions and boundary criteria for each level.

1. Biomes. "Ecosystems of continental proportion described by biotic components, particularly the type of vegetation which gives it its characteristic aspect."[2] Each of eight categories is described by vegetation life form, climatic characteristics, and geographical location (e.g. deciduous forest, woodland-brushlands).
2. Physiographic Regions. "Ecosystems of regional proportion described by abiotic components, particularly the type of land form and soils that give it its characteristic aspect."[3] Twenty-two categories are identified. Physiographic region boundaries basically have been taken from the works of Fenneman (1928) and Hammond (1965), as represented in the National Atlas of the United States of America for the conterminous United States and from Wahraftig (1965) for Alaska. Regional descriptions consist of a General Description which includes predominant land forms, predominant soil orders, and annual precipitation,and growing season. A Specific Description of each region is provided which includes the region boundary in relation to Küchler's (1964, revised 1975; 017) vegetation association boundaries. Discussion of boundaries is presented in narrative form.
3. Sub-Physiographic Regions. No categories exist at present; states may further subdivide physiographic regions into smaller units depending upon needs. The manual example given is to separate the Teton Mountains from the Northern Rocky Mountain Physiographic Region.
4. Associations. "Ecosystems described (like biomes) primarily by biotic components, particularly vegetation, but differing from biomes by being intraregional in the physiographic sense and of much greater homogeneity. Associations are named usually from two or more dominant plant species which are physiognomically similar and ecologically related."[4] Association names and geographical distribution are consistent with the terminology and map of Küchler (1964, revised 1975; 017). Associations included within each physiographic region are listed in the manual.

5. Habitat Site. "Local ecosystems influenced by regional physiography and intraregional Associations, but defined very specifically by local vegetation and local land form. The Habitat Site is the most homogeneous and specific member of the hierarchical scheme of Ecosystems represented in the Bureau's Integrated Habitat Analysis System."[5]

The Habitat Site name incorporates the dominant and subdominant vegetative species and local land form. Habitat Sites are the basic aerial photography mapping units at a scale of 1:24,000. Boundaries are defined by changes in vegetation life form and species composition apparent from the imagery. Boundary distinctions between habitat types are largely left to the judgement of the photo interpreter and the field observer.

Habitat Sites are also defined by field collection of certain information elements which are integrated to describe the Habitat Site. Information elements required include faunal and floral lists, including population parameters; local climatic data; local soil characteristics; topography; ecological interrelationships among plants, animals, and the abiotic environment; and expected responses to human impact.

To encourage standardization of Habitat Site names, each state BLM office compiles a list of habitat types, usually in conjunction with state game and fish departments. A standard land form list, and a list of aquatic habitat sites are included in the draft manual.

5a. Habitat Sites for Colorado. A series of 23 Habitat Sites were identified for Colorado. Habitat Sites are identified on the basis of dominant plant species. Minimum size is 5 acres, with the exception of aquatic habitats which are noted regardless of size.

Product

The system is currently under development; hence, documentation and products are not available at this time.

Related Systems

Potential Natural Vegetation Classification (017).

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[1] USDI Bureau of Land Management, Denver, Colorado, "Integrated Habitat Analysis," draft manual, May 3, 1976. p. 3.

[2] Ibid, p. 3.

[3] Ibid, p. 3.

[4] Ibid, p. 3.

[5] Ibid, p. 4.

Title

(Range Site and Condition Classification)

"Range Management Handbook," U.S. Department of Interior, Bureau of Indian Affairs, September 1965.

Contact

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Main Interior Building
19th & E Streets, N.W.
Washington, D.C. 20245
(202) 343-9177

Objective

To determine rangeland carrying capacity for such purposes as profitable livestock protection, watershed protection, game and fish management, recreation, and other demands.

Background

The Bureau of Indian Affairs has adopted a range site and condition method for conducting range inventory. The manual cited above outlines the method and procedure to be followed by BIA Technicians in evaluating the forage resource on the range, the procedure to be followed when making utilization studies, and the general format for the preparation of range management plans upon completion of inventories.

Description

The method utilized is based on the ecological principle of plant succession and the potential of an area to support a self-perpetuating climax community. Procedure involves establishment of climatic or physiographic zones reflecting significant differences in productivity as influenced by rainfall, elevation, growing season, exposure, temperature, and other factors. Technical descriptions for each range site record the actual or estimated composition of the climax vegetative cover, the climatic conditions, topography and elevations, and soils.

Range condition, based on a measured departure from the climax for each range site, is defined as the state and health of the range based on what that range is naturally capable of producing. Determination of condition class is based on vegetative composition.

Plant species are divided into the following categories according to their ecological response to grazing: Decreasers, Increasers, Invaders and Exotics.

Four significant range condition classes are recognized according to the percent of the present composition that is climax for the site: Excellent - 76-100%; Good - 51-75%; Fair - 26-50%; and Poor - 0-25%. The same four classes are used for revegetated range based on percent of optimum stand.

Products

Products include maps and summaries of data which serve as a basis for management planning. A Glossary of Terms used in Range Management compiled and edited by the Range Term Glossary Committee in 1974 is used with the handbook. Further information can be obtained by contacting the Division of Trust Services, Bureau of Indian Affairs, Washington, D. C.

Title

Interim Wetlands Classification System

"Interim Classification of Wetlands and Aquatic Habitats of the United States", by L. M. Cowardin, V. Carter, F. C. Golet and E. T. LaRue, U.S. Fish and Wildlife Service, Office of Biological Services, 1976.

Contact

National Wetlands Inventory
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217 Dade Building
9620 Executive Center Drive, N.
St. Petersburg, Florida 33702

Objective

To group ecologically similar habitats, so that value judgements can be made; to furnish habitat units for inventory and mapping; to provide uniformity in concepts and terminology throughout the entire United States, as an aid to people charged with management of wetlands and aquatic habitats.[1]

Background

The Interim Wetlands Classification System was developed to replace the Martin, et al., (1953) classification system as outlined in the combined classification and inventory USFW Circular 39 (Shaw and Fredine 1956). Development of the present classification was initiated in 1974 in response to the need for an updated national inventory. The primary task of the classification is to impose boundaries on natural ecosystems for the purposes of inventory, evaluation, and management. It is considered a working classification system which has been field tested.

Description

Structure of the Wetlands Classification is heirarchical and progresses from the most general level of Provinces to major Ecological Systems and Habitat Types. Modifiers for water regime and water chemistry are added to the order to form the habitat type. In the absence of Orders, these modifiers are coupled with classes or subclasses.

Province in the Wetlands System is directly equivalent to Section in Bailey's system of Ecoregions (1975). The definitions of the levels of Bailey's hierarchical classification do not present the levels preciesely but do indicate the general character of the classification: Domain, subcontinental climate; Division, regional climate; Province, broad vegetation regions and zonal soils; and Section, climatic climax.

Bailey's system only accounts for inland regionalization; therefore, ten additional Provinces were developed for marine and estuarine habitats according to marine currents, sea temperatures, turbidity, and ionic concentrations.

The following levels are defined by the National Wetlands Inventory.

Ecological System defines a complex of wetlands and aquatic habitats similarly affected by one or more dominant chemical, hydrological and geomorphological factors.

Subsystem divides the ecological systems according to dominant ecological forces.

Habitat Class describes the general appearance of the habitat in terms of dominant plant forms for vegetated areas are in the form of the substrate for non-vegetated areas. Classes may be subdivided into subclasses; i.e., forested and shrub wetlands may be divided into evergreen and deciduous subclasses on the basis of leaf persistence.

Habitat Orders are differentiated from habitat subclasses in terms of soil type, vegetation, or dominant sedentary animal communities. Life form, growth habit, or physiognomy of the dominant plants are among the most important parameters used in this classification.

Habitat Type, the most detailed taxon of the classification, has a characteristic plant and animal community in a given province.

Modifiers for water regime and water chemistry are added to the habitat order to form the habitat type (e.g. seasonally flooded, subsaline, emergent wetland on mineral soil). Special modifiers indicating man-made and man-modified wetlands and aquatic habitats are also included. Understanding of wetland dynamics is important for classification since the habitat type may be difficult to identify at certain times.

Products

1) "Interim Classification of Wetlands and Aquatic Habitats of the United States," by L.M. Cowardin, V. Carter, F.C. Golet and E.T. LaRue, U.S. Fish and Wildlife Service, Office of Biological Services, 1976.

2) "Existing State and Local Wetlands Surveys (1965-1975)", Volumes I and II. This survey compiles information on wetlands inventories conducted by federal, state and local governments and private groups since 1965. Volume I is a series of 1:750,000 scale maps showing the location and extent of major wetlands inventories. Volume II is a composite narrative descriptio by state.

3) "Index of Selected Aerial Photography of the U.S." 1975, an atlas of recent high altitude aerial photography presented on 1:750,000 scale maps.

4) "Bailey's Ecoregions and Hammond's Land-Surface Form Maps for the U.S.," a series of 1:250,000 scale maps delineating ecoregions, physical subdivisions, and land-surface forms of the United States.

The above products can be obtained by contacting the National Wetlands Inventory.

Related Systems

Ecoregions (004).

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1 National Wetlands Inventory, U.S. Fish and Wildlife Service, "Interim Classification of Wetlands and Aquatic Habitats of the United States," 1976, p. 9.

Title

Land Use and Land Cover Classification System

"A Land Use and Land Cover Classification System for Use with Remote Sensor Data", Geological Survey Professional Paper 964, by James R. Anderson, Ernest E. Hardy, John T. Roach, and Richard E. Witmer, U.S. Department of Interior, Geological Survey, 1976.

Contact

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Objective

To provide a framework for a national land use and land cover classification system for use with remote sensor data to meet the needs of federal and state agencies for up-to-date land use and land cover information for use in planning and management activities.

Background

An Interagency Steering Committee on Land Use Information and Classification was formed in 1971. Representatives included personnel from USGS, NASA, Soil Conservation Service, Association of American Geographers, and the International Geographical Union. The objective of the committee was to develop a national classification system receptive to inputs from both conventional sources and remote sensors, which would provide a framework for more detailed studies by local agencies. The resultant classification system, presented in USGS circular 671, was a modification of the New York State Land Use and Natural Resources Inventory which had been designed for use with aerial photos at 1:24,000 scale.

Each category of the classification system was subsequently subjected to testing and evaluation by the USGS using high altitude data from three test sites. Research of Pettinger and Poulton (1970) was also incorporated into the study. Extensive testing and review of categorizations and definitions outlined in USGS circular 671 resulted in publication of USGS Professional Paper 964.

Description

The system described in USGS Professional Paper 964 is a "resource-oriented" land use and land cover classification. The emphasis is on remote sensor data; activity, therefore, must be interpreted using land cover as a surrogate. Types of land use and land cover identifiable primarily from remote sensor data are used as a basis for organizing the classification system. Four levels of classification are outlined as follows:

Level I - use of LANDSAT data - 9 generalized categories, such as; Agricultural Land, Rangeland, Water, etc.

Level II - use of high altitude (less than 1:80,000 scale) data - breakdown of Level I categories into 2-7 subcategories. For example, Level I, Water, would be divided into Streams and Canals, Lakes, Reservoirs, and Bays and Estuaries.

Level III - use of medium altitude (1:20,000 to 1:80,000 scale) data with further division of Level II categories developed by the particular user.

Level IV - use of low altitude (more than 1:20,000 scale) data with further division of Level III categories developed by the particular user.

The multilevel land use and land cover classification system has been developed because different sensors will provide data at a range of resolutions dependent upon altitude and scale.[1] Descriptions of categories are provided in Professional Paper 964 for Levels I and II only (Levels III and IV should be developed by particular users according to specific needs). Interpretations of data rely on patterns, tones, textures, shapes, and site associations; therefore, descriptions of categories identify the patterns and features recognizable on remote sensor data.

Level II is described as the "fulcrum" of the classification system. This level provides a nationwide general framework for formulation of Levels III and IV by particular users. At Level III, use of substantial amounts of supplemental information in addition to remote sensor data at a scale of 1:15,000 - 1:40,000, should be anticipated.[2] The nature of remote sensor data precludes categories such as ownership-management units unless this supplemental information is used. When Levels III and IV are developed by particular users, sufficient description should be provided for aggregation into Levels I and II for use on a state or national scale.

Products

Level II interfaces well with USGS topographic maps for map presentations. Level I can be indicated on maps by the one digit code or can be color coded using a modified version of the World Land Use Survey (International Geographical Union 1952) color scheme. Level II can be represented by the two-digit code. Users can develop Level III and IV representations.

Specifications must be written to apply the general classification scheme to a specific mapping or data-computation program. A set of such specifications will be released by the U.S. Geological Survey in the near future.

The Land Use Data and Analysis (LUDA) Program of the U.S. Geological Survey is designed to provide a systematic and comprehensive collection and analysis of land use and land cover data on a nationwide basis. The above referenced classification system was developed for use in the LUDA Program. Maps will be compiled at about 1:125,000 scale showing present land use/land cover at Level II of the classification. Individual land use/land cover maps and their associated data will be released as they become available following compilation. Periodic revision of the data is planned. Requests for information on the Land Use Data and Analysis Program can be sent to Dr. Richard E. Witmer or Dr. James R. Anderson at the U.S. Geological Survey, Reston, Virginia.

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[1] J.R. Anderson et al., "A Land Use and Land Cover Classification System for Use with Remote Sensor Data", U.S. Geological Survey Professional Paper 964, USDI Geological Survey, 1976, p. 6.

[2] Ibid, p. 7.

Title

(Park Planning)

"Park Planning", Chapter II from Management Policies, National Park Service, April 1975.

Contact

National Park Service
Rocky Mountain Regional Office
645-655 Parfet Avenue
Denver, Colorado 80215

Objective

To perpetuate and protect the natural, cultural, and recreational resources of the National Park System and provide for their enjoyment by the public in such a manner and by such means as will leave them unimpaired for future generations.

Background

The National Park System lands are classified to designate where various management and use strategies are being applied in fulfilling the objectives and the purpose of the park. The classification is based on the inherent nature of park resources and the suitability of the land for the management and uses.

Land classification is covered within a required General Management Plan (formerly called Master Plan) for each park area. The General Management Plan is prepared to guide management, interpretation, and development of each National Park Service area and defines the long term management objectives and strategies to achieve them.

The current planning process was developed as an in-house effort in 1975, and is standardized throughout the National Park Service System. The classification categories are defined in the park planning section of the "Management Policies."

Description

Four general area zones are recognized-- natural, historic, development, and special use. Within this framework, special subzones are designated within any park where desirable to indicate in greater detail how the land or water will be managed. Decision criteria between the levels is based upon existing or proposed land use and extent of human activity and disturbance. The Natural Zone is composed of one or more subzones where natural resources and processes remain largely unaltered by human activity except for approved developments essential for management, use, and appreciation of the park. The natural subzones can consist of Wilderness Subzone (managed according to wilderness policies); Environmental Protection Subzone (managed to protect lands and water possessing particular value for wildlife and/or for research); Outstanding Natural Feature Subzone (managed to protect geological and biological features of unusual intrinsic or unique values); Natural Environment Subzone (managed to provide for environmentally compatible recreational activities and protection of environment).

The Historic Zone includes all lands containing cultural resources listed on, or eligible for the National Register of Historic Places. (No subzones.)

The Development Zone includes lands and waters where nonhistoric park development and intensive use, existing and proposed, do or may substantially alter the natural environment. This zone is managed to provide and maintain development, such as buildings, parking, roads, and utilities, that serve the needs of park management and relatively large numbers of visitors. (No subzones)

The Special Use Zone includes special uses of lands and waters not permitted in natural, historic, or development zones. This zone can consist of: Reservoir Subzone (includes major reservoir and adjacent lands where the National Park Service does not have exclusive authority); Landscape Management Subzone (includes nonhistoric lands where artificial manipulation creates an intensive managed landscape); Private Development Subzone (non-Federal lands and waters within park boundaries); Resource Utilization Subzone (where utilization or removal of nonrenewable environmental resources is legally sanctioned).

Data bases for these levels are acquired and collated as needed through coordinated information gathering efforts by the parks, Regional Offices, Service Center, as well as other government agencies and Regional interests. Scope and complexity of the information base varies according to the objectives of the planning effort.

Products

Classifications are incorporated into a General Management Plan for each park which includes: Statement for Management (park's purpose, significance, influences, and management objectives); Resource Management Statement or Plan (strategies for protecting, perpetuating and preserving natural and cultural resources); Visitor Use Statement or Plan (strategies for interpreting park resources, for providing visitor use and safety, and for supplying information and support services); General Development Statement or Plan (outlines development necessary to accomplish the Resource Management Plan and Visitor Use Plan).

Title

Uniform Recreation Supply Classification (proposed)

Contact

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Objective

To facilitate standardization of recreation data at all levels; and to permit aggregation and generalization of data for specific purposes such as policy making, allocation, or for site specific planning.

Background

The Bureau of Outdoor Recreation is exploring the feasibility of developing a new outdoor recreation information classification system. The system is designed to be used in developing and updating State Outdoor Recreation Plans (SCORPS). A random sampling of some 20 state plans was conducted to compare the system with existing practices. The recommended system has undergone extensive review in Washington and in the Regions. Two draft analyses were developed (one in May 1976 and the other in June 1976) to ascertain information concerning kinds of data and levels of detail presently used in the development of SCORPS. An in-house memorandum dated August 25, 1976 describes the most recent modifications made in the system, generally for the purposes of simplification.

Description

The proposed Uniform Recreation Supply Classification System is a six-unit system of data collection based on demonstrated state needs as determined from a review of existing SCORPS. The system is designed to provide outdoor recreation information data that can be used at various degrees of concern and intensity for national, regional, or local matters. Levels of information will vary according to the subject matter and purposes for which the data are to be collected analyzed and presented. Modern data processing techniques can be readily adapted to the system.

Land Use and Cover Classification (described in USGS Professional Paper 964; 012) constitutes the first of five classifications. The classification utilizes two levels for use with data derived mostly from high altitude satellite and aircraft imagery. Levels I and II would be applicable on a nationwide, interstate and statewide basis, while Levels III and IV, intentionally left open-ended, would be employed at the intrastate, regional, county, or municipal level.

Administrative Classification concerns ownership or administration of recreation resources. Four levels of detail are applicable to the federal agencies, three for the remaining public agencies. Level I differentiates between public and private, while Level II further differentiates between federal, state, and local, and between profit and nonprofit. Federal agencies are listed by Department and independent agency at Level III and broken down further into constituent levels at Level IV. Only Level III is used for state and local government. States will be able to subdivide their administrative entities beyond Level III as needed.

Resource Management Objective involves collection of management objective data which provides a measure of recreation resources available, or potentially available. Classification is carried only to the second level, although further breakdowns can be made.

Recreation Area Classification, by Type is based on locational factors with respect to population centers. All state inventories use a system for classifying recreation lands and waters. Most are based on the ORRRC-BOR system. It is anticipated that most systems presently in use could be easily adapted to the proposed system to attain the desired standardization of land types.

Outdoor Recreation Activity Classification, and Outdoor Recreation Facility and Natural Resource Classification to Support Activities are designed to record data on outdoor recreation use and facility/resource information. The two parts of the system are intended to relate to each other but for purposes of data handling it is convenient to distinguish between them. Use and facility/resource are readily matchable within any one level which will permit the combination of activity data and supply inventory in a common language. Depending upon the intended use, different levels of detail and aggregation are possible.

Products

At this time, the Uniform Recreation Supply Classification System has not been applied.

Title

(Irrigation Suitability Classification)

USDI Bureau of Reclamation Manual, Volume V, Part 2, April 9, 1953.

Contact

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Objective

The specific purpose of land classification, as stated in the Fact Finders' Act of 1924, is to classify lands with respect to their power, under a proper agricultural program to support a family and pay water charges; to establish the extent and degree of suitability of lands for sustained irrigation; to identify lands to be included in an irrigation system; and to provide definite, sound, and relatively permanent basic data which are essential to solving agronomic, economic, and engineering problems associated with Bureau of Reclamation work. The system with certain modifications is applicable to both rainfed and irrigated agriculture under either private or Government ownership and management irrespective of subsidies or repayment policies. It is currently being used for evaluating land suitability for reclamation of surface-mined areas.

Background

The Bureau of Reclamation uses a standardized system of classifying lands based upon potential productivity, cost of production, and land development costs of land under irrigation. Irrigability classification of lands began with the passage of the Reclamation Act in 1902 as a part of the preliminary examinations made by the Geological Survey. In addition, the Fact Finders' Act of 1924, subsequent appropriation acts, adjustments acts, Reclamation Project Act of 1939, and Appropriation Act of 1953 include direct reference to the classification of lands. Although the system is uniformly applied throughout the Bureau, since many factors involved in site evaluation vary according to the location of the project site (i.e. hydrological, climatological), a different set of specifications is established for each project. Description of the classifications system is located in the Bureau of Reclamations Manual, Volume V, Part 2.

Description

The Bureau of Reclamation classification system is structured according to seven basic principles: 1) prediction. 2) economic correlation, 3) arability - irrigability analysis, 4) permanent-changeable factors, and the three rules from traditional logic requiring that the classification be based on 5) a single factor. 6) be exhaustive, and 7) have mutually exclusive subdivisions.[1] A system based upon these principles is flexible enough to fit the specific environments and demands of individual projects.

The classification scheme is based upon agronomic and economic experiences and is employed principally for economic purposes. It involves fitting engineering, agricultural, economic, and social considerations into the process of formulating irrigation plans. Distinctions between land classes are based on differences in features; however, the mapping specifications expressing these differences are developed on the basis of economic factors such as productive capacity, costs of production, and costs of land development. Primary land characteristics and conditions correlated with economic values include soil, topography, and drainage. Project development considerations which particularly influence land classification are the following: 1) water supply, including quantity and quality 2) type, location, and extent of the supply, distribution and drainage systems 3) water rights, including their availability, possibility of pooling and transfer; and 4) repayment and benefit-cost considerations of the various alternatives.[1]

Land may be separated into six basic classes representing levels of payment capacity. "Class 1 represents lands with high payment capacity, Class 2 represents lands of intermediate payment capacity, and Class 3 includes lands of the lowest suitability for general irrigated agriculture. Class 4 is the class representing the lowest suitability for general irrigated agriculture and may not be restricted to special use. Lands in Class 1-4 are thus characterized by increasing deficiencies and restrictions. Class 5 lands are not irrigable under existing conditions but have potential value sufficient to warrant tentative segregation for further study. In some cases, these lands are in existing projects and their irrigability depends on additional scheduled project construction (e.g. drains), or upon land improvements (e.g. leaching of excessive amounts of salts). Class 6 lands are not suitable for irrigation and are considered nonirrigable."[2]

Three types of land classification are recognized within the system: reconnaissance, semidetailed, and detailed. Each of these represents a standard scale of operation and is differentiated according to amount of detail included and the accuracy of the results. Reconnaissance land classification involves a "general outline of land features of conspicuous importance in preliminary planning of irrigation development in a particular region".[3] This classification will be delineated on maps with a scale of 1:24,000 (2,000 feet to the inch) or on contact prints of aerial negatives. Semidetailed land classification involves "careful examination of land features of about one-half mile intervals on potentially irrigable areas while irrigable areas are covered in a more general manner".[4] Surveys with this system will be accomplished on maps with a scale of 1:12,000 (1,000 feet to the inch), preferably aerial photographs adjusted to this scale. Detailed land classification involves "the examination of land features in sufficient detail to provide information as to the extent and character of the various lands in each 40-acre tract".[5] Information obtained through this classification will be delineated on maps having a scale of 1:4,800 (400 feet to the inch). A smaller scale (not less than 1:12,000) may be utilized on fully developed areas or on highly uniform new land areas without existing or anticipated problems associated with soils, topography, or drainage.

Topographic maps and aerial photographs are used as base maps for developing land classification surveys. Field methods vary from place to place depending upon the adequacy of base maps, complexity of physical conditions, and specific objectives of the survey.

Products

The principal products of the system are land classification reports which include the general land classification maps and pertinent data obtained from the field sheets. The resulting data contribute to the determination of the irrigable area, related investigations such as return flow studies, determination of project payment capacity, location of distribution and drainage systems, assessment of OM & R and construction costs, and farm and system management.

Additional information pertaining to local studies may be obtained by contacting the appropriate Bureau of Reclamation Office.

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[1] USDI Bureau of Reclamation, "USDI Bureau of Reclamation Manual", Volume 5, Part 2, April 9, 1953, p. 2.4.4.

[2] J.T. Maletic, "Using Soil Survey Information in Land Classification for Irrigation". Address delivered before the American Society of Agronomy and Soil Science Society of America on November 19, 1952, at Cincinnati, Ohio, p. 2.

[3] USDI Bureau of Reclamation Manual. p. 2.6.1.

[4] Ibid, p. 2.6.1.

[5] Ibid, p. 2.6.1.

Title

(Forest Cover Types of North America)

"Forest Cover Types of North America" published by Society of American Foresters, 1954 (reprinted 1975).

Contact

Society of American Foresters
5400 Grosvenor Lane
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Objective

To describe and classify the forest cover types of the eastern U.S.

Background

The Society of American Foresters first undertook the description and classification of forest cover types of the eastern U.S. in 1929. At the time the report was issued in 1932, there was a scheme for western types in use which had been developed by the U.S. Forest Service prior to 1913. The western classification was revised to establish unity of terminology and of concept. A report was published in 1945 which covered the western part of the continent, exclusive of Mexico.

Description

The Society of American Foresters defines forest type as "a descriptive term used to group stands of similar character as regards composition and development due to given ecological factors, by which they may be differentiated from other groups of stands".[1] Composition is considered the primary basis for recognition of the type, since development within a given type may vary according to the quality of sites.

Classification is based on existing forest cover types which have a unique ecological, silvicultural and management value. The following principles are employed in the selection of combinations to be recognized as forest types. First, the cover type must represent the characteristic composition occupying large areas in the aggregate. Secondly, the cover type must be distinctive and readily separated from other similar types. Lastly, every significant combination of cover within those limitations must be recognized as a forest type. In general, mixtures and transitions between types are assigned to one or another type on the basis of predominance of one or another species. A mixed type is established in place of two pure types in those cases where the two-species mixture is more common than pure stands of either species.

The principle of employing species names which would describe the composition is used in naming the cover types. The type name is confined to a single species or to a binomial, when possible. Some cases require the use of a general descriptive name in order to avoid using a name longer than a trinomial. Since site is commonly used to refer to a sub-division of the cover type, words indicative of site are not used in the type names.

Species are arranged in the type name according to numerical importance or indicator value. Common and scientific names are taken from Little (1953).

Type names for eastern cover types are classified by habitat and forest regions. An additional grouping on the basis of soil moisture relations is also used. Western types are listed by natural groups starting with the coldest region and working toward the warmest. Detailed descriptions for all types for both East and West are presented in appendices. Also included are lists of the scientific and common names of all tree species as well as an index of forest type.

Products

Variations of the SAF Forest Type Classification are used by many federal and state agencies.

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[1] Society of American Foresters, "Forest Cover Types of North America", 1954 (reprinted 1975), p. 2.

Title

Potential Natural Vegetation Classification - (Küchler)

"Potential Natural Vegetation of the Conterminous United States", by A.W. Küchler, American Geographical Society, Special Publication No. 36, 1964. (Manual accompanies map).

Contact

None

Objective

To facilitate the classification and mapping of vegetation.

Background

The vegetation map was produced by Küchler with the cooperation of the USDA Forest Service, Forest and Range Experiment Stations, the USDA Soil Conservation Service, and the Bureau of Land Management. The project was sponsored by two grants from the National Science Foundation. The original map compilation reduced and drafted for publication with the aid of cartographers in the American Geographical Society.

Description

Vegetation is defined by Küchler as the mosaic of phytocenoses in the landscape. A phytocenose is synonomous with a plant community and is comprised of a given combination of life forms and a given combination of competing taxa with relatively uniform ecological requirements. The uniqueness of a particular plant community is a result of the presence and particular proportion of life forms and taxa. These two elements are used as the criteria for establishing the vegetation types or units shown on the map.

"The life form pattern gives a plant community its physiognomy and structure, whereas the species pattern accounts for the floristic composition."[1] Physiognomic types are characterized by only one or a few life forms and consist of easily recognizable categories occurring over wide areas. The floristic approach allows for a choice among the different levels of taxa. All vegetation units on the map are characterized by genera, not species.

Küchler defines potential natural vegetation as "the vegetation that would exist today if man were removed from the scene and if the resulting plant succession were telescoped into a single moment".[2] Potential natural vegetation as a term always applies to a specific date since climatic fluctuations and the effects of man's earlier activities are constantly influencing the succession and composition of plant communities. Küchler's map representing the potential natural vegetation of 1964 (revised in 1975), depicts the geographical distribution of the types of vegetation and their relation to one another. The map is intended to stimulate detailed research on the vegetation of smaller areas and on individual vegetation types.

The manual referenced above, designed to supplement the map, includes an extensive description of legend items. All legend items are placed on the same level; no hierarchical structure of classes is involved. Such a system permits a uniform approach to vegetation on a nationwide basis.

The map legend includes a description of each vegetation type divided into five categories: title, physiognomy, dominants, other components, and occurrence. Title consists of a number, English names, and the botanical names of dominant genera. Physiognomy is described in a brief and generalized manner. Dominants, important for the characterization of any vegetation type, are given by species. Other components are listed to present a more complete picture of the floristic nature of the vegetation. Occurrence is cited to facilitate identification of the location of vegetation types.

In a later publication (Küchler 1967), Küchler outlined the comprehensive method for vegetation classification which is employed in the recording and mapping of a mass of vegetative data for each recognized plant stand. This method represents the result of nearly 30 years of revision of a preliminary "Geographic System" which constituted five groups of characteristics involving 25 physiognomic terms. "The basic steps in the preparation of a vegetation map using the recommended approach of Küchler are an examination of available literature on the vegetation of the area, a stereoscopic study of aerial photographs in the laboratory prior to field work and delineation in the laboratory of potential vegetation stands, preparation of a Phytocoenological Record in the field for each stand, modifications in the field of previous delineations by photo study which prove to be untenable in the field, finalizing of records of field observations upon return to the laboratory, and finally the selection of elements to be included on the final map. The end product may be based on few or many of the categories for which data have been recorded."[3]

Products

The map "Potential Natural Vegetation of the Conterminous United States" at a scale of 1:3,168,000 is available from the American Geographical Society. The accompanying manual is presently out of print. Variations of the Küchler system are used by many federal and state agencies.

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[1] A.W. Küchler, "Potential Natural Vegetation of the Conterminous United States," American Geographical Society, Special Publication No. 36, 1964, p. 5.

[2] Ibid, p. 2.

[3] U.S. Army Engineers Topographic Laboratories, "Study of Classification and Nomenclature of Vegetation", Fort Belvoir, Virginia, June 1976, p. 25.

Title

(Forest Vegetation Classification - Daubenmire)

"Forest Vegetation of Eastern Washington and Northern Idaho", by Rex Daubenmire and Jean B. Daubenmire, Washington Agricultural Experiment Station, Technical Bulletin 60, 1968.

Contact

None

Objective

To provide a classification of remnants of virgin forest vegetation on an ecosystem basis.

Background

Ecologic studies of the forested regions in eastern Washington and northern Idaho were begun by R. Daubenmire in 1936. Financial support by Washington State University through State Initiative 171 funds from 1946-1951 led to the publication of a general forest survey. The above referenced report is the product of more intensive research funded by the National Science Foundation from 1959-1968.

Description

The study area covered by this report included portions of the forested lands of Washington and Idaho and a few associated remote stands outside of the study area. A complete census was made at each study site of size class of trees, coverage and frequency of all species of shrubs and herbs, and altitude, aspect, slope, pH, and other soil data. All stands investigated had an area of at least 15x25 meters with a relatively homogeneous overstory and understory and freedom from ecotonal effects. Stable vegetation was selected for study to determine the closest relationship between vegetation and environment. Ten centimeter soil cores were collected at regular intervals within the plots.

The first step in the vegetation classification was to group stands according to the species showing the strongest evidence of self-perpetuation. Eight forest subdivisions were delimited at this stage. These eight major forest divisions were then subdivided into 22 types according to differences in shrubs and herbs dominating the undergrowth.

Each of the 22 types is characterized by a particular combination of climax tree and understory dominants called associations. Associations are in turn grouped into "series" according to common features.

Daubenmire uses the term "habitat type" to define the fundamental ecologic units in a landscape. Habitat type is described by Daubenmire in his textbook as follows: "All parts of the landscape that support, or are capable of supporting, what seems desirable to consider as the same kind of relatively stable phytocenosis (homogeneous as to dominants in all layers) in the absence of disturbance, comprise one habitat type."[1] Habitat type is used to account for the potential of a diverse region to support a single climax association.

The association supporting each habitat type in undisturbed condition is described in the referenced article. All information on potential seral and disclimax communities, animal life, climate, topography, soils, and distribution is indicated for each habitat type. The referenced publication also includes a key to coniferous forest habitat types in eastern Washington and northern Idaho.

Products

Variations of the Daubenmire system of classification are used by many federal and state agencies.

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[1] R. Daubenmire, Plant Communities, Harper & Row, New York, p. 260.

Title

(Heritage Program Classification)

(No written description available)

Contact

Robert E. Jenkins (or)
Robert M. Chipley, Director of National Research Operations (or)
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Objective

To facilitate the selection of a representative sample of landscapes across the U.S. to be acquired for preservation.

Background

The Nature Conservancy was officially established in 1951 to identify and preserve the country's remaining natural lands. This effort involves the creation of a national inventory and data base on natural areas and ecological diversity. The inventory will include information on the existence, abundance, status, condition, and distribution of ecological systems and components. The goal is being realized largely through the proliferation of State Natural Heritage Programs which are being established on a state-by-state basis. Biotic elements of ecosystems across the state are identified and described. At present, nine such programs have been established covering all or part of 12 states.

In addition, the Nature Conservancy is contracted by the National Science Foundation (NSF) to collect information on "Established Scientific Ecological Reserves" into a central repository and to organize the information for computerized access. The Nature Conservancy is also recipient of a grant from the Exxon Company, U.S.A. to conduct a similar but more comprehensive data compilation effort on preserved lands generally. Other projects related to the national inventory and data base include developing certain natural area data, making and cooperating on other, particularly more localized, inventories, and developing data management methodologies.

Description

Until a more suitable national classification system is generated, The Nature Conservancy is using the system developed by Heritage Programs. The approach of these programs involves treating more abundant species in community aggregates and collecting specific information for only a limited number of the rarest species which demonstrate the greatest need for protection. A classification is developed for each state according to its particular needs. Each classification consists of a number of plant communities at whichever level of distinction is appropriate. Vegetation types and classifications vary from state to state. For aquatic habitats, a two parameter permutation consisting of 1) water basin and 2) hydrological type is used. Habitats of endangered, threatened, endemic, and intolerant species and the locations of unique or critical areas (i.e., special breeding areas, champion trees, etc.) are defined as actual localities occupied by organisms, not as landscapes which appear suitable for a particular species. Each element (i.e., bald eagle, oak hickory forest) is considered independently and information on general range, ecological relationships, and other pertinent material is stored in an element file compiled for the state. Information on an estimated 600 to 1000 species has been assembled in this manner for the country.

Records of various agencies and literature pertaining to species distribution are carefully researched prior to identification of key areas. Once established, element occurrences are computerized to facilitate access.

Products

Element files and related abstracts are used for the purposes of identifying, selecting, and acquiring lands of significant natural value. More information may be obtained by contacting The Nature Conservancy.

SECTION II

SUBREGIONAL SYSTEMS

Title

(Statewide Inventory of Natural and Man-made Resources)

"Statewide Inventory of Natural and Man-made Resources," (includes several large-scale resource documents).

Contact

Joint Federal-State Land Use Planning Commission
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(907) 279-9565

Objective

To develop a statewide inventory of natural and man-made resources to be used for determining management decisions for Alaskan lands and resources.

Background

The Joint Federal-State Land Use Planning Commission for Alaska was assembled in accordance with Section 17 of the Alaska Native Claims Settlement Act (Public Law 92-203) and by act of the State of Alaska (Alaska Statute 41.40.010). The Commission consists of ten members representing both Federal and State governments and is assisted by a permanent staff which includes planners, economists, lawyers, and resource specialists. As a portion of the Commission's charge, a Resource Planning Team was established in July 1972 to prepare a statewide inventory of natural and man-made resources. This inventory was completed in July 1974 and is being used in policy and plan development.

Description

One of the objectives of the Commission is to establish policies and recommendations for the development of a comprehensive land management system. Included will be suggestions on procedural changes necessary to provide coordination among landowners and government agencies regulating land use. To meet various objectives, the Commission has undertaken a series of interrelated studies on land systems, socioeconomics, and management systems.[1]

The land systems study, directed at developing alternative land policies and strategies, will result in the production of major reports dealing with resource inventory analysis, ecosystems analysis, and impact analysis.

The products of this work program are expected to provide the Commission with a substantial body of information which can be used to systematically evaluate future land management activities according to the natural environmental character of the land. Recommendations will be compiled for inclusion in a final report to Federal and State administrations, to Congress, and to the Alaska Legislature.[2]

This extensive land resources inventory utilizes a number of different classifications depending upon the specific resource under consideration. The map "Major Ecosystems of Alaska" (1973), for example, includes a classification scheme which describes the different land and marine components, their occurrence, soils, fish and wildlife, and man's relationship to each component.

Products

The end products of the inventory effort, published in July 1974, include the 92 volume "Alaska Resources Inventory," together with a summary entitled "Resources of Alaska, A Regional Summary." A set of some 800 overlays and maps at a scale of 1:250,000 designating the different physical, biological, and human resources of the State have been produced. Public access to this system is limited due to its length and limited quantity.

In addition, the Arctic Environmental Information and Data Center (AEIDC) has completed a series of six regional documents entitled "Alaska Regional Profiles" which is based on the "Alaska Resources Inventory." Data for this series are presented in text, maps (1:1,000,000), and tables. Format and map scales are consistent throughout the series. These may be ordered from AEIDC or the State of Alaska.

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[1] Joint Federal-State Land Use Planning Commission for Alaska, "The Environment of Alaska; Analysis of the Impact of Potential Development", August 1976, p. (1-1)(2-2).

[2] Ibid. p. (1-1)(2-2).

Title

(Natural Vegetation of Arizona)

"The Natural Vegetation of Arizona," ARIS cooperative Publication #2. by C.H. Lowe and D.E. Brown, Arizona Resources Information System, 1973.

Contact

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(602) 942-3000

Objective

To map the natural vegetation of Arizona.

Background

The above-referenced manual accompanies the color map of the "Natural Vegetative Communities" of Arizona (Brown, 1973). The state vegetation map is taken to a resolution at and within the biome level. The system and components of natural classification for the vegetation are described in Lowe (1964). The Arizona Game and Fish Department is currently updating Brown's map to incorporate field data. Guidelines for collection of field data follow Brown and Lowe (May 1974 and November 1974).

Description

The Natural Vegetative Communities described in the manual are:

- Alpine Tundra
- Spruce-Alpine Fir Forest
- Montane Conifer Forest
- Riparian Deciduous Forest
- Juniper-Pinyon Woodland
- Encinal and Mexican Oak-Pine Woodland
- Interior Chaparral
- Plains and Desert Grasslands
- Mountain Grassland
- Great Basin Desertscrub
- Mohave Desertscrub
- Sonoran Desertscrub
    - a) Arizona Upland subdivision
    - b) Lower Colorado subdivision
- Chihuahuan Desertscrub

Each of the vegetative community descriptions includes typical elevations, precipitation, and a list of dominant and other characteristic plants and animals. The authors state that animals listed are characteristic of the communities indicated and may occur in others.

All of the above-listed communities are depicted on the referenced map except riparian deciduous forest communities which comprise a limited geographic area but are of great biological importance. The composition and form of the riparian forest changes with elevation. Their distinctive life form and riparian habitat distinguish these biotic communities from adjacent vegetative communities.

An appendix to the manual lists common and scientific names of representative dominant and other characteristic plants and animals given in the text for each vegetative community.

Products

In updating Brown's map, "The Natural Vegetative Communities of Arizona" (1973), the Arizona Game and Fish Department is transferring data from 1/2 inch:mile field maps to mylar. A review and correction process will follow. Further information can be obtained by contacting the Arizona Game and Fish Department, Phoenix, Arizona.

Title

(Ponderosa Pine Forest Inventory)

"A Descriptive Inventory of Ponderosa Pine on National Forests in the Salt-Verde Basin, Arizona", by Ronald A. Senn, Jr., USDA Forest Service General Technical Report RM-26, June 1976.

Contact

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Rocky Mountain Forest and Range Experiment Station
USDA Forest Service
240 W. Prospect Street
Fort Collins, Colorado 80521
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Objective

To describe the commercial ponderosa pine within the Salt-Verde Basin, Arizona.

Background

The inventory is designed to facilitate evaluation of broad management alternatives for the National Forest ponderosa pine area within the Basin.

Description

Specific components of the commercial forestland are determined by the land's productivity and logging capability. Commercial forest land is defined as lands currently producing, or capable of producing, a minimum of 20 cubic feet of industrial wood fiber per acre per year (Green and Setzer 1974). Commercial forest lands are considered either operable or inoperable. The distinction between these two components is based on the presence or absence of constraints associated with sawtimberlogging. In the future, operability restrictions could be determined by different land use and timber product constraints. Inoperable lands are divided into one of three categories: Physical restrictions, Land use constraints, and Administrative directives. Operable lands are categorized as Nonstocked, Fringe pine, "Dog hair thickets", and Merchantable production. Each of these subclasses are outlined in a written description.

Data base is provided by continuous forest inventory (CFI) information. A wide range of sources provides description of ownership, composition, distribution and production. Pine vegetation areas were delineated on maps (scale: 1/2 inch = 1 mile; Brown, 1973). National Forest and U.S. Geological Survey topographic maps were used to identify ownership of the commercial pine component. Forest personnel and previous publications (Barr 1956, Ffolliot et al. 1972, Green and Setzer 1974) provided additional information. Soil analysis was conducted to group soils with similar timber productivities. Stand character descriptions were developed for each of the 14 soil groups. After completion of the stand table descriptions, estimates of the various productive components of the CFI were made.

Products

Results of the inventory include a tabulation of the classifications of commercial forest land and an analysis of soil type distribution in the Salt-Verde River Basin (Az) which are available upon request.

The inventory information was eventually coupled with a ponderosa pine growth simulator to develop yield information needed for economic evaluations using L-P modeling techniques. The evaluation results will be published through the Rocky Mountain Station in Flagstaff by Tom Brown, Economist.

Title

Soil-Vegetation Surveys in California

"Soil-Vegetation Surveys in California", State Cooperative Soil-Vegetation Survey, California Division of Forestry - Department of Conservation, Pacific Southwest Forest and Range Experiment Station - Forest Service - U. S. Department of Agriculture, Division of Agricultural Sciences - Agricultural Experiment Station - University of California, Published by: State of California, Resources Agency, Department of Conservation, Division of Forestry, November 1958 , (revised 1969).

and

"Soil-Vegetation Maps of California", by Wilmer L. Colwell, Jr., Pacific Southwest Forest and Range Experiment Station, Forest Service, U. S. Department of Agriculture, USDA Forest Service Resource Bulletin PSW-13/1974.

Contact

Director
Department of Conservation
1416 Ninth Street
Sacramento, California 95814
(916) 445-5656

Objective

To provide basic information about soils and vegetation for better management of foothill and mountain wildland.

Background

The Soil-Vegetation Surveys in California is a study of the different kinds of upland soils in the state and where they are found; the natural cover of trees, grasses, and other vegetation; and how soils and vegetation are related. The survey has been in progress since 1947. Cooperating agencies are the California Department of Forestry, California Department of Conservation, the U. S. Forest Service, and the University of California. Other agencies conducting soil surveys, such as the U. S. Soil Conservation Service, coordinate their surveys with those of the Soil-Vegetation Survey, and publish cooperative reports.

Description

Normally, two or more men with professional experience work as a team in the survey area. Classifying and mapping of soils and vegetation follows a closely integrated procedure. Aerial photos are a key tool in the survey.

The team follows a general procedure of: 1) reconnaissance of the area, 2) comparison of appearance of vegetation with appearance on aerial photos, 3) photo interpretation and, 4) detailed field investigations. Information is mapped by means of aerial photos and later transferred to USGS 7 1/2 minute quadrangle base maps.

Soils are mapped and classified according to the standard soil classification system of the National Cooperative Soil Survey of the U.S. Dept. of Agriculture. The Soil Series is the principal unit used. Soil series are separately named and standardized within the state and nation. They are distinguished by physical, chemical, and morphological characteristics, and by the type of parent material or parent rock from which the soils were formed. Soil series are further subdivided into Soil Phases which show differences such as depth of soil, slope, rockiness, or erosion.

Field crews identify species of shrubs and trees and classes of herbaceous cover in the mapping unit. They measure the age and height of commercial timber species. Where grass is an important part of the vegetation, a sample of one-acre plots is taken to determine the composition and total cover of herbaceous vegetation.

Vegetative elements are listed in order of abundance. The order of the symbols on maps indicates the relative abundance of species. Some types of vegetation, such as grasses, marsh, bushy herbs, etc., may not be classified as to species.

A species must occupy a specified percentage of crown space and ground space to be mapped in a delineated area. However, map symbols for conifers which have been reduced or eliminated to less than 5 percent cover by logging, burning, etc., are shown in parenthesis. Areas without soil and climatic conditions suitable for growing commercial conifer crops are also symbolized. Two groups of cover class and species are symbolized where distinct vegetation units cannot be designated separately at a particular mapping scale.

Products

Details of the vegetation and soils mapping and classification scheme can be found in the two above referenced documents and in the Field Manual, Soil-Vegetation Surveys in California, May 1954, (revised October 1954). The director of the project is Wilmer L. Colwell, Pacific Southwest Forest and Range Experiment Station, P.O. Box 245, Berkeley, California 94720.

Information obtained by the survey is published on maps and supplemented by legends, descriptive material etc. The soil vegetation maps are bluelined 7 1/2 - minute quadrangle sheets at a scale of 2 inches to one mile. Generalized soil maps and timber stand-vegetation cover maps have been produced for some areas.

Six tables accompany the maps: 1) list of soil series mapped and general characteristics,2) soil series symbols, 3) definition of plant species symbols, 4) information from sampling plots, 5) list of plant species recorded,and 6) list of current taxonomic classification of the soils according to National Cooperative Soil Survey standards.

Title

Timber Inventory - Forest Type and Stand Classification

"The Preparation of Forest Type and Stand Classification Maps", USDA Forest Service, Region 5, San Francisco, California, Division of Timber Management, April 1965 (Revised November 1968).

Contact

Timber Management Staff
USDA Forest Service, Region 5
630 Sansome Street
San Francisco, California 94111
(415) 556-2184

Objective

To prepare Forest Type and Stand Classification maps.

Background

The Timber Inventory - Forest Type and Stand Classification System is intended to be of universal utility in management of National Forest Resources in California. The age-density classification, April 1957, is superseded by this forest type and classification system. The system was adapted to California use from a similar one used in the Pacific Northwest since the early 1950's. The instructions begin with the aerial photo phase of mapping and carry through with specifications for stand mapping and transfer of delineation to base maps.

Description

Lands are classified under three major headings: Commercial Forest Land, Noncommercial Forest Land, and Nonforest Land. Commercial Forest Land is defined as forest land which is producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. Commercial Forest Lands are further classified into ten Forest Types (e.g.: Redwood, Douglas-Fir, Incense Cedar, Hardwoods, etc.). The type of sawtimber stands are derived from the species or group of species with plurality of basal area. All other stands are based on the number of stems. Specific mapping symbols indicate Residual Stand or Planted. Definitions are provided for designation of overstory and understory. Species composition of the Forest Type is recognized if it comprises at least 20% of the Type unit by basal area in sawtimber type units or number of stems in pole or seedling - sapling type units. Species symbols are listed in decreasing order of abundance. No more than three species are identified within the Type unit. A listing of species is provided under the three major categories of Conifers, Hardwoods, and Oaks.

Forest stands are also grouped into size classes based on tree diameters. Class designations are: seedlings and saplings, pole timber, small sawtimber, large sawtimber, and large old growth sawtimber. Density of stocking is expressed as the percentage of crown closure as seen on aerial photographs. Decadence Rating of overstory in tree groups classifies groups of overstory trees into broad classes representing relative stand vigor and health.

The second major land classification is Noncommercial Forest Land. This class is defined as forest land that does not meet commercial land criteria.

The third major classification is Nonforest Land. This class includes land that never supported forest tree species and lands formerly forested where forest use is precluded by current land use. Unimproved roads, streams, canals, etc., must be more than 120 feet wide and clearings must be more than one acre to qualify as nonforest.

Products

Detailed instructions are included in the referenced document for aerial photo interpretation. Field checking provides verification of the photo interpretation. Steps to follow in preparation of the Forest Type and Stand classification map include: 1) delineation of National Forest land on aerial photos according to Forest Type and Stand classification specifications and 2) transfer of delineation to suitable base maps and preparation of the final map.

Contact District Headquarters for availability of Timber Inventory information in specific localities.

Title

(Urban Geology)

"Urban Geology, Master Plan for California", Bulletin 198, California Division of Mines and Geology, Sacramento, California, 1973.

Contact

Thomas E. Gay, Jr., Acting State Geologist
The Resources Agency of California
Division of Mines and Geology
1416 Ninth Street, Room 1341
Sacramento, California 95814
(916) 445-1923

Objective

To define and elucidate the measures necessary to avoid or minimize life loss and property damage in urban areas due to dynamic geologic processes and to reduce the loss of mineral resources to urbanization.

Background

The project was conducted by the Division of Mines and Geology of the Department of Conservation with the assistance of private consultants and in cooperation with the office of Planning and Research of the Governor's Office. It extended over a three-year period from July 1, 1970, to June 30, 1973.

The study was designed to include regional identification of present and potential urban development - geologic environment conflicts; a critique of government and private sector responsibilities; recommendations; and legislative and organizational needs. The report should be used as a guide for dealing with hazards and the conservation of mineral resources in the areas of urban development.[1]

Description

Phase I of the project involved collection of data on the location and severity of the following geologic problems on a statewide basis:

- seismic activity
- fault displacement
- volcanic activity
- tsunami
- slope stability
- land subsidence
- erosion activity
- expansive soils
- flooding
- ground water degradation
- loss of mineral resources

Then, a method was developed for defining priorities for quadrangles based on the number of severity of geologic hazards. Geologic factors were then combined with population projections to determine those areas that would be given a high priority for geologic study. Other objectives of Phase I were to devise a method of presentation of geologic information and to identify agencies responsible for and capable of solving geologic problems.

Phase II was designed to test the methodology devised in Phase I, analyze cost/benefit ratios, and prepare a draft Master Plan.

Phase III involved revision of the draft and preparation of the final project report.

Products

Original copies of maps and office reports collected and prepared during Phase I are available for public inspection at the Division of Mines and Geology in Sacramento. A Division of Mines and Geology 1:750,000 scale geologic map of California is included in the Phase I report. Phase I and III reports contain numerous tables and maps. Further information can be obtained by contacting the Division of Mines and Geology, Sacramento, California.

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[1] California Division of Mines and Geology, "Urban Geology, Master Plan for California", Bulletin 198, Sacramento, California, 1973, p. 15.

Title

(California Habitat Types)

"University of California, Natural Land and Water Reserves System: An Annotated List of California Habitat Types," by Norden H. (Dan) Cheatham and J. Robert Haller, December 1975, (revision and eventual publication is planned).

Contact

Norden (Dan) Cheatham
University of California Natural Land and Water Reserves System
Systemwide Administration
University of California
Berkeley, California 94720
(415) 642-2211

Objective

To prepare an annotated "checklist" needed to compare the features of one site with those of another in striving to include adequate samples of the state's habitat types in a series of research natural areas.

Background

"The Natural Land and Water Reserves System (NLWRS) was established by the Regents of the University of California in January 1965. The purpose of the system is to provide land parcels throughout the State of California, owned by the Regents or available for use by the University, for the purpose of preserving samples of the State's diverse natural habitats in as undisturbed a condition as possible..."[1] The reserves are for educational and research use. As of December 1976 there were 23 reserves in the system.

In the process of examining prospective reserves, the authors determined a need to go to a more detailed level of habitat types than the well known Munz and Keck (1959) classification of California Plant Communities.

Description

The habitat list is described as hierarchical with the broadest level entitled "major category." Nine Major Habitats are listed: Coastal and Shoreline Habitats, Dune Habitats, Scrub and Chaparral, Grasslands/Vernal Pools and Meadows, Bogs and Marshes, Riparian Habitats, Woodlands, Forests, Alpine Habitats, and Aquatic Habitats. The Major

Habitats are further subdivided into from two to seven Habitat Types. The Habitat Types are divided into two lower categories entitled Major Subdivision and Minor Subdivision. The authors state that "differentiation at these lower levels is sometimes subtle."[2] The above listed categories are enumerated in the text of the referenced document and are also presented in tabular form with columns entitled Distribution, Ecological Features, Description, and Characteristic Species. The distribution column includes a brief statement of how a particular habitat type is distributed in California. The Ecological Features and Description columns provide a brief statement on the "attributes" of a particular category. The characteristic species column is plant oriented.

The authors have attempted to cross reference their classification scheme with those of Munz & Keck (1959), Thorne (1976), and W. James Barry (unpublished), Plant Ecologist for the California Department of Parks and Recreation; the Tables therefore include a column entitled Equivalent Classifications. The authors' work goes into finer detail than the other referenced work.

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[1] N.H. Cheatham and J.R. Haller, "University of California, Natural Land and Water Reserves System: An Annotated List of California Habitat Types," December 1975, (revision and publication planned), p. 1.

[2] Ibid, p. 3

Title

(Instructions for Range Surveys)

"Instructions for Range Surveys", as formulated by the Inter-agency Range Survey Committee and adapted by the Western Range Survey Conference, April 24, 1937.

Contact

L. E. Horton, Regional Ecologist
USDA Forest Service
Region 5
630 Sansome Street
San Francisco, California 94111
(415)556-8551

Objective

To provide instructions for field mapping work in range analysis.

Background

The 1937 Instructions for Range Surveys established some standard range types for use throughout the western states. The USDA Forest Service, Region 5, Range Management Staff, field mapping work in range analysis is still based on these types, but other of their activities make use of other classification groupings.

Description

Forage Types are designated according to the predominant forage type. The conspicuous or most important species or genus symbol is shown first, followed by minor species. Ordinarily, not more than three symbols will be shown in a designation. Symbol specifications and color legend are described in the Instructions. Eighteen Types are described in the Instructions, such as Grassland, Meadow, Perennial forbs, etc. A category entitled Waste encompasses all areas of dense timber and brush which have no value for grazing or have such slight value that they cannot be used economically, owing either to denseness of standing or down timber, or sparseness of forage growth. This type also includes rough and inaccessible areas. Abandonded lands are indicated on the maps.

Products

Range analysis maps of forage types are produced. Contact Regional Headquarters for information available for specific localities.

Title

(Ecosystem Guide for Mountain Land Planning)

"An Ecosystem Guide for Mountain Land Planning, Level I", by Dr. Dennis L. Lynch, Colorado State Forest Service, Colorado State University, Fort Collins, Colorado (no date given).

Contact

J. R. Getter, Resource Inventory Forester
Colorado State Forest Service
Colorado State University
Fort Collins, Colorado 80523
(303) 491-6304

Objective

To assist planners and landowners in Colorado with environmental planning in the foothills and mountain areas.

Background

The guide was developed in 1973 and subsequently tested and revised. An initial edition was published in May, 1974. This final product was published for general use after review by planners, private consultants, educators, and environmental specialists. The guide provides: 1) a starting place for basic environmental planning; 2) a general description of mountain ecosystems; and 3) a mechanism to encourage better utilization of professional expertise in environmental planning. The maps and guide serve as a general summary which may be useful in identifying potential land use problems and opportunities.

Description

The author of the system has chosen vegetation as a critical component upon which to base an ecosystem classification. Vegetation units can be used as an indicator of the interaction of many environmental factors.

Four levels of planning intensity are proposed to fit planning needs of different locations and to optimize time, money, and expertise available to planners. Level I utilizes components of vegetation types, elevation, and slope. Remote sensing with field checking may be used as a data source. Potential problems can be identified at this level. Level II utilizes components of vegetation types, elevation, slope, aspect, and terrain. Data can be obtained from aerial photographs with field plots. Information at this level is used to identify localized problems. Level III utilizes Ecosystem Response Units and requires on-site inventory and analysis. Site capability is analyzed at this level. Level IV encompasses ecosystem modeling using computer techniques for testing land use alternatives.

The guide referenced above provides Level I methods of ecosystem description and mapping. Seventeen ecosystems common to the Colorado mountains are identified and described. Ecosystems are classified on the basis of ground cover comprised of plants and plant forms. Each ecosystem identification and description is followed by a description of characteristics (dynamics, esthetics, wildlife, water table, soil) and hazards (wildfire, avalanche, flood, climate). Nine of the ecosystems are identified by predominant vegetative species (e.g.: Aspen trees comprise at least 50% of vegetative cover; Greasewood-Saltbrush comprise at least 20% of vegetative cover; Limber-Bristlecone Pines are the dominant tree cover, etc.). Four ecosystems are identified by plant forms (e.g., Mixed Conifer, Mountain Shrubs, Mountain Grasslands and Meadow). Five ecosystems are identified by environmental conditions supporting associated plant forms, such as presence of water (Aquatic, Bog, Riparian) and elevation (Alpine). Two additional mapping categories, not ecosystems, are provided - non-vegetated areas and others (cropland, high density residential, etc.). Factors in addition to vegetation which may be used for identification of an ecosystem include location of water table, slope, typical elevation, etc.

Products

For Level I, areas are identified on aerial photos and transferred to map overlays. Field checks substantiate photo interpretation. Map information is supplemented by a Potential Problem Indicator Table which is included in the guide to alert planners to problems related to each ecosystem type, and to provide a means for planners to develop questions about potential problems and seek applicable expertise.

The Colorado State Forest Service has developed a mapping program to provide Level I ecosystem information. The package consists of: 1) USGS quadrangle sheet; 2) slope overlay; 3) ecosystem overlay; 4) guide; and 5) Wildfire Hazard Area Map.

Title

(Pattern Recognition of Wildlife Habitat) (Colorado, Wyoming, Utah)
(no published document)

Contact

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Cooperative Wildlife Research Unit
Colorado State University
Fort Collins, Colorado 80521
(303) 493-5396

Objective

To identify habitat characteristics for particular animal species which can be used to determine suitability of habitat.

Background

The Cooperative Wildlife Research Unit is presently developing a habitat assessment system as a part of a contract for U. S. Fish and Wildlife, Office of Biological Service. Development of the system was begun in March 1976 and efforts will continue into 1979. The system is designed to be a diagnostic scheme for evaluating impacts of development on an area and assessing general wildlife management practices. Of particular importance in this study is an evaluation of the impacts on the land surrounding an oil shale development site.

Description

Pattern recognition will be used to determine the probability of a particular animal species occurring within a given habitat and the suitability of that habitat to satisfy the species' requirements. Probabilities for ideal and marginal habitat will be determined for a number of habitat characteristics. Habitat characteristics will vary according to animal species but representative characteristics will include food composition, vegetation, diversity, interspersion and land use. Suitability indices will be determined from probabilities. At present, the conceptual approach is fairly well developed and basic habitat characteristics are being selected. By 1977 selected habitat characteristics for mule deer, peregrine falcon and blue bird will have been selected and processed through the system to test the feasibility of the method for those three species.

Data bases have not been determined at this time, but remote sensing, particularly color infrared, may be used extensively. The project will probably involve a computerized mapping system.

Products

The system will not be fully operational for a year or two; therefore, no products are available at this time.

Title

Colorado Land Use Classification

"Colorado Land Use Classification System," by Robert Burns, Information Services Report No. 5, Department of Local Affairs, Colorado Division of Planning, July 1976.

Contact

Robert Burns, Senior Planner
Department of Local Affairs
617 State Services Building
Denver, Colorado 80203
(303) 892-2351

Objective

To develop a system to meet the need for a comprehensive, statewide frame of reference for describing, analyzing, and mapping land use.

Background

The Colorado Land Use Classification System was developed to deal specifically with characteristics of the Colorado landscape for planning purposes. It was designed to meet the need for a comprehensive statewide frame of reference for describing and mapping land use to facilitate coordination of planning throughout the state.[1] The system constitutes one of several subsystems to eventually be incorporated into a state geographic information system. It has been tested in several locations in Colorado. All state (regional, county, and local) planning agencies are encouraged to use the system. The manual for the system, Information Services Report No. 5, July 1976, is referenced above.

Description

The basis of the Colorado Land Use Classification System is "cultural landscape" or the condition found on the earth's surface as a result of the cumulative effect of human activity.[2] Factors considered in design of the system include 1) General landscape 2) Human environment 3) Conservation of land resources 4) Economic development and 5) Public and private costs related to land use. The system is described as a hierarchial system with First, Second and Third Order Categories.

The First Order Categories were chosen for maximum relevance to planning on the basis of their effect on human environment. The broad categories of the First Order include Urban and Community Functions, Residential, Heavy Industry-Transportation-Utilities, Resource Extraction, Developed Recreation, Irrigated Farmland, Range Grazing, Low Impact Land Use, and Major Military.

In Second Order Categories, further distinctions are made, such as density/type of structure categories under the First Order-Residential Category (i.e. ski area, golf course, etc.). The manual provides written descriptions of First and Second Order Categories. First and Second Order Categories are sufficient for State and regional planning purposes.

Third Order Categories have been developed for each of the Second Order Categories of Urban and Community Functions only, and further divide the Second Order Categories into specific use categories. For example, within the Second Order category of Major Public Buildings or Grounds exist Third Order distinctions of Church, Library, Cemetery, etc. No need was found for Third Order development under Second Order Categories other than Urban and Community Function. Third Order Categories are listed, but not described. Third Order Categories are intended for municipal and local, large scale mapping. This Third Order is open ended.

Products

The system is designed for application at a range of scales for different levels of planning. It is primarily designed for compilation and mapping at 1:24,000 using USGS base maps and 1:24,000 quad centered aerial photo enlargements. Auxiliary information is obtained from local familiarity, aerial photo interpretation, and field checking. For 1:24,000 scale mapping a minimum area of 5 acres is suggested. For municipal and local planning, the system has been adapted to large scale mapping. First and Second Order Categories may coordinate well with the new USGS 1:50,000 County Map Series.

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[1] R. Burns, "Colorado Land Use Classification System," Information Services Report No. 5, Department of Local Affairs, Colorado Division of Planning, July 1976, p. 1.

[2] Ibid, p. 3.

Title

Wildlife Habitat Identification Program

Contact

Don Schrupp
Colorado Division of Wildlife
Environmental Resource Section
6060 Broadway
Denver, Colorado 80216
(303) 825-1192

Objective

To develop a systematized method of incorporating wildlife data to be used in establishing wildlife management and land use decisions.

Background

The Colorado Division of Wildlife has developed a computer-inventory system designed specifically for compiling data on wildlife. The system has been in use since 1972.

Description

The system involves identification of areas within counties which are important for key wildlife species. Major divisions of the system are game and non-game, terrestrial, and aquatic. Field guidelines are used in the gathering of data.

Products

Maps are generated by computer. The DOW is updating the state map files by species and county; at present five counties have been completed and 11 others are partially completed. A habitat map for the entire state is also being developed. No manual or written guidelines exist for this system.

Title

(Comprehensive Land Use Planning)

"Planning Handbook for Local Governments" by Bureau of State Planning and Community Affairs, Division of Budget, Policy Planning, and Coordination, Boise, Idaho, April 1976.

Contact

Shirl Boyce, Jr., Chief
Bureau of State Planning and Community Affairs
Division of Budget, Policy Planning and Coordination
112 Statehouse
Boise, Idaho 83720
(208) 384-2411

Objective

To establish long range planning and environmental analysis procedures.

Background

The "Planning Handbook for Local Governments" was developed in response to the Local Planning Act of 1975. Preparation of the document was aided through the office of the Governor, Division of Budget, Policy Planning and Coordination, of the State of Idaho and financed in part through a comprehensive Planning Grant from the Department of Housing and Urban Development, under provision of Section 701 of the Housing Act of 1954, as amended. The product reflects efforts to develop guidelines to be used in the preparation and implementation of a comprehensive plan.

Description

The system for land use classification is derived from the Soil Conservation Service scheme and the USGS system as outlined in Professional Paper 964 (1976; 012). McHarg's overlay approach is also incorporated in addition to modifications introduced by Shirl Boyce of the Bureau of State Planning and Community Affairs. Much of the data are obtained through SCS as well as various other state and federal agencies. The system has been used for five years.

A system of three-level mapping is recommended. The classification system is divided into eight Level I categories: Urban and Built-up lands, Agricultural land, Rangeland, Forest or Woodland, Water and Wetlands, Barren lands, Mining and Quarrying lands, and Transportation. Each of these categories is subdivided into Levels II and III. No decision criteria between or within levels are offered.

State mapping is at Level I, county mapping is at Level II, and city mapping is at Level III. Map scales are as follows: 1/16 inch to 1/2 inch = 1 mile for Level I; 1/2 inch to 1 inch = 1 mile for Level II; and 1 inch = 1 mile to 1 inch = 300 feet for Level III. A color and pattern coding system has been developed by the Bureau of State Planning and Community Affairs through consultation with various federal, state and local agencies. A flexible system is recommended that seeks agreement at Levels I and II while leaving Level III determinations to the discretion of local planners. Multi-state, multi-county, and city/county cooperation on planning matters is much improved by standardizing coding at Levels I and II.

Products

City and county comprehensive plans constitute the principal products of this system.

Related Systems

Land Use and Land Cover Classification (012).

Idaho 502

Title

(Habitat Types)

"List of Habitat Types", State of Idaho Department of Fish and Game.

Contact

Department of Fish and Game
600 South Walnut
Boise, Idaho 83707
(208) 384-3700

Objective

To facilitate statewide and regional planning processes concerning wildlife and other related resource management needs by combining habitat types with wildlife species.

Background

A range analysis team was responsible for developing the system utilized by the Idaho Department of Fish and Game. The purpose of the system is to relate the importance of habitat types to the location, abundance, and kind of wildlife species. A document entitled "List of Habitat Types" outlines the various habitat classes. The system became operational in January 1976 after two years of development. It is intended for use on statewide and regional planning levels after January 1977.

Description

The system is comprised of 34 habitat classes or components. Vegetation types represent the categories since they are considered to indicate species distribution. Among these habitat classes are the following: Douglas-fir, Cedar-Hemlock, Subalpine, Alpine, Wet and Dry Meadows, Cottonwood, Willow. Characteristics of each habitat class are described, as well as its location, climate, value to wildlife, and actual associations within which it is included. Vegetation composition determines the decision criteria between classes.

Data base includes satellite imagery, U-2 flight data, conventional aerial photos, and ground truthing data. Color infrared maps at a scale of 1:15,000 are also used.

Products

No products are available at this time.

Title

(Land Use Planning)

"Land Use Planning", by Sandpoint Zone Planning Team, Idaho Panhandle National Forest, Sandpoint, Idaho (date unknown).

Contact

Dan Chism
Sandpoint Zone Planning Team
Idaho Panhandle National Forests
Sandpoint, Idaho 83864
(208) 263-5111

Objective

To determine suitability of land for long-term resource use and to structure alternative management plans protecting the productivity of the land.

Background

The Sandpoint Zone Planning Unit has been developing and using a process to prepare coordinated plan alternatives covering a range of resource uses and related values. The projected end result of the application of this process is the allocation of land for one or a combination of primary values or uses. The new planning effort, a revision of the multiple use planning concept of the early 1960's, is in response to the National Environmental Policy Act of 1969 as well as in response to the need for good information on land as a valuable and scarce resource.

Description

The planning process involves examination of the following parameters: capability and suitability of the land to support resource use, opportunities and constraints connected with land productivity, alternatives and conflicts regarding land capability and resource use, and analysis of benefits and costs. Each of these parameters is considered in the numerous inventories, among which are Visual Sensitivity, Recreation, Hydrology, Soils, Fisheries, Geology, Wildlife, Transportation, Vegetation, and Socio-economic. Inventory information is compiled on a common scale base map, from working maps or annotated photographs.

Integration of all the data is achieved by the use of the resource capability unit, (RCU) a land unit defined by similar soil, landform, and vegetative features that will have a predictable response to land use.

Photos, particularly one-inch-to-the-mile scale, high altitude imagery, are used extensively. Color and infrared photos are taken for particular resource data or of specific problem areas.

Each inventory employs a different classification system. The appendix of the document includes a description of the techniques, standards, and intensity for the major inventories.

Products

The document is available upon request.

Title

(Water Resources Feasibility Study)

"Department of Water Resources - Feasibility Study" (Carey Act Project).
Idaho Department of Water Resources, Boise, Idaho.

Contact

Ken Dunn, Assistant to Director
Idaho Department of Water Resources
4th and Fort Streets
Boise, Idaho 83702
(208) 384-2215

Objective

To facilitate categorization of land areas into units of similar soil characteristics and topographic features having comparable capabilities to sustain use over time.

Background

The State of Idaho Department of Water Resources has been using a system of classification which is patterned after the classification schemes of the Bureau of Reclamation and the Soil Conservation Service. The purpose of the system is to categorize land areas according to irrigation suitability. The system is defined in the Feasibility Study for the Carey Act Project.

Description

The system is comprised of capability classes similar to those used by the Soil Conservation Service. Class 1 lands have slight limitations, Class 3 lands have severe limitations, and Class 6 lands are characterized by very severe limitations. Each of these categories is delineated by different soil or land characteristics such as salinity, slope, water table, rockiness, and textural modifiers.

Two kinds of classification methods are used: standard land classification, and detailed land classification.

Standard classification involves examination of land features at about one-fourth-mile intervals on potentially irrigable areas (non-irrigable areas are covered in a more general manner). This type of classification is designed to determine proper land use, size of farm units, irrigation and drainage systems, and other parameters.

Products

The document is available upon request.

Title

(Land Use Planning)

"Land Use Planning", by Idaho Department of Lands, Boise, Idaho, October 14, 1976 (temporary operations memorandum).

Contact

Lynn H. Thaldorf
Natural Resource Planner
State of Idaho Department of Lands
Statehouse
Boise, Idaho 83720

Objectives[1]

1. To provide guidelines for classification of State endowment lands as to retention for management or disposal by sale or exchange.
2. To establish the highest and best use of each tract or unit of endowment land consistent with sound management practices.
3. To provide management guidelines for land managers.

Background

In late 1974, the Idaho Department of Lands developed a land use classification system to accomplish the objectives mentioned above. The system was developed by considering other systems already in use and adapting them to fit the needs of the department. Presently the system has only been tried on one pilot project. The system description is available only in temporary form as listed above.

Description

The classification system is comprised of four broad management zones: travel influence zone, water influence zone, special management zone, and general management zone.

Travel Influence Zone includes lands adjacent to major travel routes, existing or proposed, including resultant areas of concentrated use. Boundary of this zone is determined by the land manager, based on his opinion of the extent to which development or intensive use will extend. This zone may be further divided into seven areas which might be managed differently: major, secondary, and restricted road systems, trails, campgrounds, points of interest, and any others not included in the above categories.

Water Influence Zone includes areas of existing or anticipated intensive public use around lakes and reservoirs and along streams and rivers. Primary use is due to the presence of water. As with the travel influence zone, the boundary will be determined by the extent to which development or intensive use will extend in the opinion of the manager. This zone may be further divided into five areas: summer home sites, public recreation, concessions, sportsman access, and others not included in the above categories.

Special Management Zone includes lands used or requiring protection for a special purpose such as archaeological, historical, or scenic interest; critical wildlife areas, environmental protection areas; recreational use; watershed protection; and possibly powerline or pipeline easements. The area designations are as follows: watershed, wildlife, recreation, fisheries, historical sites, archaeological sites, special permit, and others.

General Management Zone includes all lands not classified for intensive management under the other three zones. Areas within the general management zone include timber, range grazing, timber grazing, agricultural cropland, and minerals or energy.

Within each zone and area classification, six broad categories of natural resources are considered: timber, range recreation, lands and minerals, watershed, and fish and wildlife. These are classed as to primary or secondary within each zone. Primary use would be the highest and best use. Secondary use would be compatible uses handled in such a way that they do not interfere with the primary use. For example, recreation and watershed are of primary concern in the travel influence zone while timber, range land and minerals, and fish and wildlife would be secondary uses.

Products

"Land Use Plan, Idaho City Pilot Project." Prepared by and for the Southwestern Idaho Supervisory Area of the Idaho Department of Lands, July 1976. This land use plan is a pioneer project which was prepared using the system. Information used for classifying the lands was gathered from field examinations, department inventories, and other agencies, particularly in the U.S. Forest Service.

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[1] Idaho Department of Lands, "Land Use Planning", October 14, 1976, p. 1-A.

Title

(Comprehensive Land Use Inventory)

"Land: Nature's Design for the Future," prepared by the Ada Council of Governments, Ada County, Idaho, October 1975.

Contact

Ada Planning Association
150 North Capitol Boulevard
Boise, Idaho 83702
(208) 384-4310

Objective

To facilitate development of comprehensive plans which reflect capability and limitations of the land.

Background

The Ada Planning Association prepared its first Background Information report in August 1973. Since that time a substantial amount of new data and information has been compiled for Ada County, mostly through surveys and analyses conducted by local, state and federal agencies. The document cited above, a background report for consideration of regional land use alternatives, represents a revision and expansion of the initial report.

Description

Soils, vegetation, land use, erosion hazard, fish and wildlife, and other resources were inventoried. Soil classification methodologies developed by Soil Conservation Service were used in determining soil capability. Vegetation is categorized into five general plant communities characterized by the predominant vegetation in the area: forested, heavily wooded lands, cropland (irrigated and dry), sagebrush-grassland, and white sage region. Winter range for deer and elk herds, feeding and breeding grounds for game and non-game birds, and fisheries are depicted on a distribution map. With the exception of the soils classifications, however, no detailed classification system is provided for any of the different resource inventories.

Data, information, and maps contained in the report were compiled from numerous agencies and sources. These are not site specific; rather, they represent a summarized or generalized form of more detailed information obtained during the course of the inventories.

Products

The report is intended to be a general planning guide to resources in Ada County and may be obtained by contacting the Ada Planning Association.

Title

(Stream Classification)

"Geomorphic and Aquatic Conditions Influencing Salmonids and Stream Classification--With Application to Ecosystem Classification," by William S. Platts, Surface Environment and Mining, U. S. Forest Service, June 1974.

Contact

Surface Environment and Mining
USDA Forest Service

Objective

To determine if geomorphic land classifications can be used to describe or classify aquatic environments in mountainous, granitic lands.

Background

Investigations were conducted from July 1970 through September 1972 over a 397 square mile area in the upper south fork of the Salmon River watershed in Idaho. Research concerned the physical structure of aquatic environments, the relationship between physical stream structure and fish populations, the influence of geomorphic processes on aquatic ecosystems, the relation of order within landforms in relation to uniformity in aquatic environments, and the potential for classifying aquatic environments from land classification systems.

This report provides information on mountainous aquatic environments, can be used to augment the Ecoclass method of classifying ecosystems developed by the U. S. Forest Service for the Pacific Northwest. The author states that the classification of aquatic resources will help to alleviate the problem of having to work the aquatic phase of classification in with the terrestrial phase at the same levels of generalization in the Ecoclass System.

Description

The investigator studied 38 streams and analyzed 2,482 transect samples for physical aquatic and streambank environments. Fish populations were investigated in 291 areas. Data were collected on stream variables, such as stream gradient, width, depth, riffle, and chemistry, and on fish population, and all information was punched on computer cards for computer analysis. Platts quantified aquatic physical conditions to determine if a relationship exists between fish populations and geomorphic conditions. He also tested the hypothesis that specific landforms are indicative of aquatic conditions.

Results of the study indicate that landforms correlate with certain types of stream environments in the study area. Aquatic environments are described and classified into the following geologic process groups:

Strongly glaciated
Cryoplanated
Fluvial
Depositional

The depositional process group is separated into two groups--water deposited and ice deposited.

Each geologic process group is further subdivided into aquatic types such as cirque basin, glacial trough, faulted bench, river spur, etc. Descriptions of geomorphology and aquatic environments are provided in an appendix to the referenced document for each geomorphic process group and aquatic type.

Platts concludes that aquatic environments can be described, classified and meshed with the ecosystem classification methodology at the geologic process group level and with some success to the geomorphic type level in the study area. Relationships between stream characteristics and fish populations are also discussed in the report.

Products

Tables relating data on fish populations to stream variables, and stream variables to specific physical properties of streams are presented in appendicies to the referenced document.

Title

(Wildlife Habitat Appraisal in the State of Kansas)

"Plan of Study: Wildlife Habitat Appraisal in the State of Kansas"
Kansas Forestry, Fish and Game Commission (draft)
"A Landuse Classification System for Wildlife Habitat Inventory in Kansas using High Altitude Photography and ERTS-1 Imagery", by Bruce H. Waddell, Kansas Forestry, Fish and Game Commission, and James W. Merchant, University of Kansas Center for Research, Inc.

Contact

Bruce H. Waddell (and)
Kansas Forestry, Fish and Game Comm.
415 Broadway
Valley Falls, Kansas 66088
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James W. Merchant
Space Technology Center
Center for Research, Inc.
University of Kansas
2291 Irving Hill Drive - Campus West
Lawrence, Kansas 66045
(913) 864-4775

Objective

To facilitate assessment of wildlife habitat both quantitatively and qualitatively; to determine impacts on existing habitats by proposed construction projects; and to evaluate projections which speculate on future habitat conditions both with and without proposed projects.

Background

The Kansas Forestry, Fish and Game Commission (FF & GC) is in the process of developing a wildlife habitat classification system through the Kansas Applied Remote Sensing (KARS) program. Part of the Kansas University Center for Research, Inc., KARS was developed in 1972 with a NASA grant to provide partial funds to aid local, state, regional, and federal agencies in the application of remote sensing to their particular problems. This program has concentrated primarily on Kansas agencies; other groups, however, have been assisted on a contract basis.

Research designed to determine the feasibility, suitability, and utility of remote sensing for measuring wildlife habitat was initiated in 1973. Further research into potential utility of digital analysis of LANDSAT tapes was undertaken by the FF & GC due to cost considerations involved in a statewide habitat inventory employing high altitude photography. An evaluation of a pilot study by Bendix Aerospace Corporation is presently being completed by the FF & GC.

KARS concurrently became involved in several other cooperative projects with Fish and Game including, for example, the use of color infrared aerial photography in management of a wetlands area and the use of LANDSAT imagery for irrigation mapping and watershed habitat mapping. Recently KARS has completed an evaluation of U.S. Fish and Wildlife Service utilization of remote sensing in ten states in the northern Great Plains and Rocky Mountains (Region 4) conducted during summer 1975.

Description

The land use classification scheme (proposed in "A Land Use Classification system for Wildlife Habitat Inventory in Kansas...") is specifically intended for use in an inventory of wildlife habitat in Kansas using high altitude photography and perhaps imagery from Earth Resources Technology Satellite (LANDSAT - 1). The system was patterned closely after the system suggested by the USGS specifically for use with remote-sensor data (Anderson, et al. 1971). Four levels of detail are outlined in this classification; of those, Levels III and IV are left to the individual user to develop. Although some changes are evident between this system and the USGS classification on Level II, the general structure is the same. The land use definitions are intended to be compatible with both the USGS classifications and the "Proposed Kansas Wildlife Habitat Evaluation System" (Kansas Forestry, Fish and Game Commission 1974).

Ideally, the following three sources will provide data on wildlife habitat in Kansas: the LUDA program, LANDSAT computer categorized data, and sampled data acquired from aerial photography of specific critical habitat components. LANDSAT and LUDA data should be stored so each 1.1 acre data unit is retrievable. Sampled data should be geographically located, stored, and integrated with LANDSAT and LUDA data.

Specific areas needing research include: development of a computerized system, or adoption of an existing computerized data system, for the purpose of storing, retrieving and manipulating data; development of a methodology to sample aerial photographs for the purpose of obtaining statistically reliable data on critical components of wildlife habitat not reliably obtained using LUDA or LANDSAT data; and refinement of procedures and dates utilized in processing LANDSAT data to obtain maximum levels of accuracy.[1] Other particulars of the system are outlined in the "Plan of Study" cited above.

Products

Projected date of completion for the study is September 30, 1977. March 31, 1978 is the final date for submission of all documents. The following five products are expected from the study:

1) selection of a data management system and development to operational mode;
2) initiation of statewide survey using three sources;
3) summary of basic data for the above area;
4) demonstration of the potential calculations additionally obtainable from the system; and
5) report containing the above information, cost estimates, feasibility for completion of survey."[2]

Related Systems

Land Use and Land Cover Classification (012).

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[1] Kansas Forestry, Fish and Game Commission, "Plan of Study. Wildlife Habitat Appraisal in the State of Kansas" (draft), p. 2.

[2] Ibid, p. 5.

Title

(Kansas Statewide Forest Inventory)

"Kansas Woodlands," by Clarence D. Chase and John K. Strickler, USDA Forest Service Resource Bulletin NC-4, 1968.

Contact

John K. Strickler, Associate State Extension Forester
State and Extension Forestry
Kansas State University
Manhattan, Kansas 66502
(913) 532-5752

Objective

To determine the status of timber resources in Kansas for management purposes.

Background

A forest survey was conducted in 1965 by the North Central Forest Experiment Station, St. Paul, Minnesota with the assistance of Kansas State University. The inventory was directed towards specific types and needs of forested areas in the state. The State Forester's office employs data from this inventory in combination with the Kansas Conservation Needs Inventory developed by SCS to establish management guidelines.

Description

The Forest Inventory quantified timber resources according to different criteria such as timber volume, log grade, growth, timber cut, standage, area condition class, etc. The classification system used in this inventory was the standard forest survey system used by the USDA Forest Service.

Products

The report cited above provides forest resource information compiled from the forest survey. It presents statistics on forest area, timber volume, growth and cut, and forest industry.

Title

(Subreconnaissance Land Classification)

"Kansas State Water Plan Studies: Subreconnaissance Land Classification Reports" (by county), Kansas State Water Resources Board, 1971.

Contact

James A. Power, Jr., Executive Director
State of Kansas Water Resources Board
Suite 303, New England Building
503 Kansas Avenue
Topeka, Kansas 66603
(913) 296-3185

Objective

To delineate lands suitable for sustained irrigation.

Background

The U.S. Bureau of Reclamation has conducted subreconnaissance land classifications for the Kansas Water Resources Board for every county in the state. Land classification is designed to delineate lands with irrigation suitability from lands not suitable for irrigation.

Description

Lands considered suitable for irrigation are divided into four classes according to the level of irrigability. Each county is thus described, and county maps are prepared to indicate the location and distribution of lands by irrigation suitability classes. General descriptions of land classes are as follows: Class 1 lands have high irrigation suitability; Class 2 lands have moderate suitability for irrigation due to limitations of soil, drainage, or topography; Class 3 lands are considered marginally suitable either because of the high costs involved to develop them or because of soil limitations; Class 3 Sp are sprinkler class lands which are not suitable for irrigation by gravity methods but which could be successfully irrigated by means of sprinkler irrigation; and Class 6 lands are not suitable for irrigation development due to serious limitations in either soil, topography, or drainage. Criteria differentiating the classes include soils, topography, and drainage.

Aerial photos of 1:20,000 were employed in the field work. In addition to the field observations, the following information was consulted: "Irrigation in Kansas," by Kansas Water Resources Board (1966-1967 data); "Land Capability Map," by Soil Conservation Service, "County Soil Survey," by Soil Conservation Service, "Major Soils of Kansas," circular 336, Kansas State University; and "Soil Conservation in Kansas," by State Board of Agriculture.

Products

Subreconnaissance Land Classification Reports of each county in Kansas have been produced and are available upon request.

Title

Proposed Statewide Landuse Mapping Program (under development)

Contact

John P. Andrews
Planning Division
Montana Department of Community Affairs
Capitol Station
Helena, Montana 59601
(406) 449-3757

Objectives

To establish a mid level land use classification system for the purpose of aiding state level policy making decisions.

Background

John Andrews of the Montana Department of Community Affairs has proposed a statewide land use/land cover mapping program in response to the need for a one-time, single year inventory of basic land information in a uniform map scale. Several agencies, including Departments of Highways, Fish and Game, State Lands, Community Affairs, Natural Resources, Health, Bureau of Land Management, and the U. S. Forest Service, are involved in developing the system. The EPA Section 208 water quality regions, RC & D project areas, State Lands Reclassification program and individual city and county planning boards would benefit from this information in their land use monitoring and planning. A manual does not exist at present; a draft of land use descriptions (8/16/76) has been compiled.

Description

The proposed classification system is comprised of 11 categories: Urban and Community Land Uses, Heavy Industry and Utilities, Rural Subdivision Tracts, Mineral Extraction, Irrigated Cropland, Hayland and Pastureland, Non-Irrigated Cropland and Pasture, Recreational Use Areas, Rangeland, Commercial Forests, Barren Tundra and Marshland, and Forest Cover. Each of these components is accompanied with a short qualifying description.

This mapping program would rely on information already compiled by the Soil Conservation Service, U. S. Forest Service, Bureau of Land Management, the Montana Department of Community Affairs, and other agencies.

Products

The proposed medium scale maps of 1:125,000 (1/2 inch to a mile) would allow a minimum size of a 40-acre cell to be shown and would coincide with map scales in use by the Bureau of Land Management, the U. S. Forest Service and the State Highway Department. Working prints should be completed during the early part of 1977 and final copies should be available a few months after the compilation of each county map.

Title

Wildlife Habitat Classification System

"M.A.E.S. Wildlife Habitat Classification System and Habitat Types: Southeastern Crow Reservation and Decker Areas, Montana."

Contact

Western Energy and Land Use Team
U.S. Fish and Wildlife Service
Federal Building
Fort Collins, Colorado 80522
(303)221-2040

Objective

To classify wildlife habitat for a coal lease study area in southeastern Montana.

Background

A wildlife habitat typing system using vegetative analyses was developed for use in documenting wildlife utilization and habitat requirements in the study area. Description of the system is contained in a 20-page document cited above. The document was provided by the Fish and Wildlife Service.

Description

Wildlife habitat types are determined by the dominant plants observed in a specific area. According to Daubenmire (1968), dominants are "those species whose removal would bring about readjustments in the edaphic, areal and biotic character of their ecosystem". Tallest trees generally constitute dominant species because of their great influence over light and other habitat factors.

The wildlife typing system involves six broad habitat types: woodland, xerophytic shrubland, mesophytic deciduous shrub-forb, grassland, cultivated, and mine disturbance. These are further divided into 29 specific habitat subtypes. A key of habitat types and subtypes and a brief narrative of each is included in the publication cited above.

Detailed vegetative analyses comprise the data base. Studies involve delineation of vegetative mapping types on the basis of dominant plant species; compilation of a plant species list for each vegetative type, and determination of indices of plant productivity, cover, and frequency of each vegetative type.

Title

(Resource Potential Classification)

"Swan River State Forest Management Plan," by the Montana Department of Natural Resources and Conservation (in press, to be published in January 1977).

Contact

Anthony J. Lukes, Jr., Environmental Coordinator
Montana Department of Natural Resources and Conservation
32 South Ewing
Natural Resources Building
Helena, Montana 59601
(406) 728-4300

Objective

To define management zones and establish management priorities for planning units.

Background

The Resource Potential Unit classification was used to prepare the Swan River State Forest management plan which has been in use since February 1976. A brief description of the system is included in the preliminary draft of the management plan. The system will be used to classify lands within other planning units in the future.

Description

The Resource Potential Unit system is constructed in the following way. Each land type is assigned a hazard rating in one of five categories of natural limitations usually associated with erosion potential: mass failure potential, erosion potential, vegetative recovery, erodability, and soil compaction. Forest habitat types are used in developing the Resource Potential Units to give an indication of potential forest productivity in terms of yield capability. Yield capability estimates used for individual habitat types were determined by Pfister et al. (1974) and are expressed in cubic feet per acre per year. Three general levels of productivity are used: low - 20-44 cubic feet per acre per year; moderate - 45-91 cubic feet per acre per year; high - 92+ cubic feet per acre per year.

Land type hazard ratings are combined with land productivity ranges to derive the five basic Resource Potential Units. Restrictions imposed by the present state of harvesting technology, slope and elevation, were incorporated with the system. Slope restriction is based on the operability limits of crawler tractor equipment which is established at slopes less than 50 percent. Elevation limit is based on reproduction problems associated with alpine fir habitats occurring at elevations above 5600 feet. Resource Potential Units which fall into an area of slope greater than 50 percent, or elevations higher than 5600 feet, are assigned a "B" modifier, while those that do not occur in areas with these technological limits are assigned an "A" modifier.

Data base depends upon the area under study: a variety of information services are utilized. Generally, past inventories conducted by the Department of Natural Resources and other data generated internally represent a principal information base. Data are also obtained from BLM and Forest Service inventories, county planning organizations, other state agencies and private companies. Some ERTS photography is used, but due to budget constraints, other remote sensing techniques are not employed.

Products:

The Swan River State Forest Management Plan is presently in final stages of completion. It will be available to the public upon request during the first part of the year. Information compiled by this inventory method is translated into Resource Potential Units from which specific action plans are developed. Another publication, "A Resource Inventory Method" for land use planning in Montana, is available.

Related Systems

Forest Habitat Types of Montana (704).

Title

(Forest Habitat Types of Montana)

"Forest Habitat Types of Montana", by Robert D. Pfister, Bernard L. Kovalchik, Stephen F. Arno, and Richard C. Presby, USDA Forest Service General Technical Report, Intermountain Forest and Range Experiment Station, Ogden, Utah, (in press).

Contact

Dr. Floyd Pond, Regional Ecologist (and)
USDA Forest Service
Region 1, Northern
Missoula, Montana 59807
(406) 329-3392

Stephen F. Arno
Forestry Sciences Laboratory
and Intermountain Forest
and Range Experiment Station
USDA Forest Service
Missoula, Montana 59807
(406) 329-2533

Objective

To provide a habitat type classification for the forested lands of Montana; to describe the habitat types according to general geographic, physiographic, climatic, and edaphic features; to describe the mature and climax plant communities of each type; to outline general management implications for each type; and to develop a method of data gathering to obtain a classification.

Background

The habitat type method of ecosystem classification was developed by R. and J. Daubenmire (1968; 018) for forests of northern Idaho and eastern Washington. After considering other approaches to forest ecosystem classification, the Intermountain Forest and Range Experiment Station and Region 1 of the U.S. Forest Service began a cooperative study in 1971 to define the forest habitat types of Montana.

Mature stands were sampled along elevational transects at selected locations. A classification system was then developed through a series of tests and refinements. Terminology was selected to correlate with R. and J. Daubenmire (1968) where appropriate.

Two preliminary drafts were prepared in 1972 and 1973. After evaluation and field testing, the final classification was developed. "Forest Habitat Types of Montana" combines and replaces the two prior works: Pfister (1972) and Pfister et al. (1973). It also replaces a 1974 review draft having the current title. This final edition will be available in May 1977.

Description

A description was prepared for each habitat type including physical environmental features, location, vegetational features, description of phases, and implications for management.

Habitat type is defined as "the aggregation of units of land capable of producing similar plant communities at climax".[1] The climax community type provides the name of the habitat type. The first name in the habitat type designation represents the climax tree species and is called the Series. The second name in the habitat type designation is based upon the dominant or characteristic undergrowth species in the climax community.[2]

A complete listing of the forest habitat types and phases is provided in Table 1 of the referenced document. The habitat types are grouped in the list under nine Climax Series. A description of the habitat types is then presented as follows: 1) Key to the Series, habitat types, and phases, 2) Series description, and 3) Habitat Type descriptions. Sixty-four habitat types are described.

The classification system is described as hierarchial in that it can be used at various levels of differentiation for various purposes. Habitat types in an area can be grouped in a logical fashion to facilitate management planning. Habitat types should be used in conjunction with soil surveys, recreation surveys, socio-economic analyses, wildlife surveys, etc., for planning and management purposes.

Products

Habitat maps have become an important management tool in the U.S. Forest Service, Northern Region 1. Maps can be prepared at various levels of accuracy depending on a particular need. Maps are prepared at a scale of 4 inches/mile to 8 inches/mile or larger for detailed projects and at scales of 1/2 inch/mile to 2 inches/mile for broader, regional planning purposes.

Related Systems

Forest Vegetation Classification - Daubenmire (018).

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[1] R.D. Pfister, B.L. Kovalchik, S.F. Arno, and R.C. Presby,"Forest Habitat Types of Montana", USDA Forest Service General Technical Report, Intermountain Forest and Range Experiment Station, Ogden, Utah (in press), 1977, p. 8.

[2] Ibid, p. 8.

Title

(Grassland and Shrubland Habitat Types)

"Mountain Grassland and Shrubland Habitat Types of Western Montana", by W. F. Mueggler, and W. P. Handl. 1974. USDA Forest Service Intermountain Forest and Range Experiment Station and Region 1, 1974.

Contact

Walter F. Mueggler	(and)	Dr. Floyd Pond
USDA Forest Service		USDA Forest Service
Intermountain Forest and Range Experiment Station		Region 1, Northern
Forestry Science Lab		Federal Building
860 North 12th East		Missoula, Montana 59801
Logan, Utah		(406) 329-3392
(801) 752-1311		

Objective

To classify land units within shrubland and grassland vegetation types according to similarity in potentials and response to management.

Background

A joint effort by Region 1 and the Intermountain Forest and Range Experiment Station was initiated in 1971 to develop a classification system for mountain grasslands and shrublands in western Montana. A progress report defining proposed habitat types in southwestern Montana was distributed in April 1973. The present system, as outlined in the document cited above, represents a combination of all data and complements a similar cooperative effort between the Intermountain Station and Region 1 to develop a habitat-type classification for forested lands. These classifications are intended to facilitate efforts to standardize mapping of Region 1 National Forest lands according to vegetation potential as well as to provide the necessary framework for organizing information on resource potentials, limitations, and responses to management. Further refinement, including management implications of defined units, is anticipated. Development of this classification system is considered only a first step in meeting the needs of the resource manager.

Description

The classification is based on the habitat-type concept developed by Daubenmire (1968). Another significant reference was Daubenmire's work, "Steppe vegetation of Washington", (1970). Grassland and shrubland vegetation are divided into series which are subsequently subdivided into habitat types. Habitat types may be further divided into phases. A vegetation key enables the field identification of series, habitat types, and phases. At present the classification and key are tentative, pending verification of certain habitat types and field testing efforts. In addition to the field keys, results of the research are presented in the following form: listings of mountain grassland and shrubland series, habitat types and phases; brief description narrative for each habitat type; appended tables showing species constancy and canopy cover on paired, differentially-grazed stands.

Nomenclature used in developing the classification follows that of Hitchcock, et al. (1969) and Booth (1966) with Hitchcock given preference.

The data base consisted of 355 intensively sampled stands and 255 general reconnaissance stands. All field data were punched onto cards for computer processing following species verification, coding, and checking of field records for clarity. A computer program was designed to summarize the stand data and to calculate the following species parameters: absolute and relative frequency, absolute and relative canopy cover, and an importance value. Stand summary data were subsequently stored on magnetic tape to facilitate future computer analyses. Another program was developed for computation of similarity indices and ordinating stands in terms of relative similarity. This program has the capacity to compare at least 100 stands by 300 characteristics. In addition, an existing cluster analysis program with similar capabilities on the Montana State University's Sigma - 7 and a program (SIMORD) allowing computations and direct computer plotting of ordinations data were adapted to the needs of the study. The resulting classification of 15 series and 31 habitat types was developed from a combination of numerical analysis techniques and subjective evaluation by association tables.

Products

Information pertaining to the data base may be obtained by contacting USDA Forest and Range Experiment Station or Northern Region.

Related Systems

Forest Vegetation Classification - Daubenmire (018).

Title

(Natural Resource/Activity Matrix)

"Natural Resource/Activity Matrix," utilized by the Division of State Parks, Department of Conservation and Natural Resources, Carson City, Nevada.

Contact

Division of State Parks
Department of Conservation and Natural Resources
221 Nye Building
Carson City, Nevada 89701
(702) 885-4370

Objective

To determine the recreational value of parkland.

Background and Description

The Division of State Parks utilizes a classification system developed for the Statewide Comprehensive Outdoor Recreation Plan. In addition, the Division utilizes a scheme of transparent overlays covering climate, topography, hydrology, vegetation, etc. A composite of the overlays displays areas of potential recreational value.

Recreational value of the land is determined by rating components of the environment (e.g. slope, soil, water) in terms of necessity for a particular type of activity. The results of these ratings are displayed in a Natural Resource/Activity Matrix. The matrix was developed cooperatively by Stevens, Thompson, and Runyan (Portland), Vasey-Scott Engineering (Carson City) and Nevada State Park System Staff (Carson City).

Products

Products of the system include transparent overlays of physical features such as soils, water, etc. and the Natural Resource/Activity Matrix which rates physical features according to influence on activities.

Title

(Vegetation and Land Use Patterns)

"Vegetation and Land Use Map of New Mexico." Technology Application Center, University of New Mexico, Albuquerque, New Mexico.

Contact

Dr. Stanley Morain
Thomas K. Budge, Program Specialist
Technology Application Center
The University of New Mexico
Albuquerque, New Mexico 87131
(505) 277-3622

Objective

To depict the vegetation and land use patterns of New Mexico insofar as they may be observed or inferred from small scale satellite images primarily for purposes of planning management.

Background

Existing maps by various federal and state agencies were carefully consulted prior to the development of the Vegetation and Land Use Map of New Mexico. A brief document accompanying this map describes the system in full. The mapping effort was intended to produce a consistent map of the vegetation types and land uses in New Mexico by applying a comprehensive interpretation to a uniform statewide base.

Description

The system developed by the Technology Application Center was designed to be integrated into the land use classification system as outlined in the USGS Professional Paper 964 (Anderson et al. 1976; 012). This scheme was deliberately left incomplete on levels 3 and 4 to accommodate the particular needs of local authorities. Categories of the New Mexico system were structured such that each category has a Level I and II equivalent in the USGS system. These correlations are listed in the document.

All areas outlined on the map are defined according to three factors: vegetation type, land use and land form. These are keyed to colors, letters and numbers, respectively. There are five physiognomic groupings: forests and woodlands, shrubland and shrub savanna, grasslands and steppes, barren and cultivated.

The following eight categories delineate various types of land use: agriculture, forestry (multiple use), grazing, military, recreational, no dominant use, extractive, and urban. Landforms identified on the LANDSAT imagery were divided into nine categories: mountains and hills, dissected surfaces, bajada surfaces, gently rolling to flat terrain (including mesa tops), river bottoms, scarps, lava flows, enclosed basins, and volcanic cones. Decision criteria between these various categories are described in the text.

Vegetation categories conform to the style used by Küchler (1964) on the map Potential Natural Vegetation of the Conterminous United States with modifications due to local conditions. Actual vegetation, not potential natural vegetation, is shown on the New Mexico map. Vegetation type data are further supplemented by maps from existing sources, land use and topographic data derived from the LANDSAT images, knowledge of existing ground cover, and information obtained from published sources.

The map was produced using 24 separate LANDSAT color composite transparencies at the scale of 1:1,000,000 as a mapping base. The EROS Center in Sioux Falls, South Dakota was responsible for making the color composites from bands 4, 5 and 7 (visible green, visible red, and infrared bands respectively). The USGS 1:1,000,000 township and range base map, along with the major cities and towns of the state, has been incorporated with the vegetation and land use information to provide a means of precise geographic location.

Soils, vegetation, biology, geology and hydrology can be combined in any way through a computerized system.

Products

Mapping of the entire state is in progress. One map, the vegetation types of the Socorro Area, was completed in 1976 from NASA U-2 high altitude color photography.

Related Systems

Land Use and Land Cover classification (012), Potential Natural Vegetation Classification - Küchler (017).

Title

(Soils of New Mexico)

"Soils of New Mexico", New Mexico State University Agricultural Experiment Station, Research Report 285, September, 1974.

Contact

Don Sylvester
USDA Soil Conservation Service
Box 2007
Albuquerque, New Mexico 87103
(505) 766-3277

Objective

To describe the characteristics of the major soils of the state.

Background

The soils information in this report is based primarily on the Agricultural Experiment Station research reports, "Soil Associations and Land Classification for Irrigation", published for each county except Bernalillo, and on published soil surveys. Climatic information was obtained from U.S. Weather Bureau sources. Geologic information was taken from C.H. Dane and G.D. Bachman (1965). The identification of Physiographic Provinces is based on Fenneman (1931).

Description

The soil classification system used in this report is the Soil Taxonomy of the U.S. Department of Agriculture which has been in official use by the USDA since 1965. The system has the six broad categories of 1) Order 2) Suborder 3) Great Group 4) Subgroup 5) Family and 6) Series. Soils are classified in each of these categories on the basis of observable or measurable properties.

Soil associations are defined in this report as "groups of soils that occur together, making up recognizable landscapes".[1] The soil associations referred to in this report are associations of great groups. A description of each association is given with the estimated percentage occupied by each of the major subgroup components, and brief descriptions of their characteristics.

Products

The publication referenced above includes General Soil Map - New Mexico at a scale of 1:1,000,000, December, 1974.

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[1] New Mexico State University, Agricultural Experiment Station, "Soils of New Mexico", Research Report 285, 1974, p. 5.

Title

(Forest Resource Inventory)

"Forest Resource Inventory", North Central RC & D Project, North Dakota Forest Service, Bottineau, North Dakota, September 1976.

Contact

School of Forestry
North Dakota State University
Bottineau, North Dakota 58318
(701) 228-2277

Objective

To determine acreage volume and types of tree cover.

Background

The six-county North Central Resource Conservation and Development Project includes major portions of the three extensively forested areas in North Dakota. Major accomplishments of the native forest survey prior to August 1976 included planning, acquiring available data and resources from other agencies, and setting up the sampling design to be utilized. No manual has been developed which describes the survey.

Description

The inventory technique is described in "Forest Resource Inventory" as follows: "Acreage determinations are being made by using a transparent acetate dot grid covering an area of six square miles in the scale of the photos used. The grid is designed to locate 256 circular sample acres and each is classified into one of three land-use classes: forest, non-forest, or water. From 47,360 dots for the North Central Region, we should have approximately 1,864 forest dots and 46,496 non-forest and water dots. For an area to be considered in the forest land-use class, it must have a minimum area of 1 acre and be at least 120 feet wide."[1] Native forest area determinations and interpretations represent the main portion of the forest inventory. A separate shelter belt inventory is being conducted using information extracted from Soil Conservation Service tree planting records.

Photo number, location, stand size class, watershed location and ownership class are recorded for each forest dot. Stereoclassification involves identifying the forest cover type and stand size stocking class. A composite areal volume table will be prepared utilizing photogrammetric measurements of tree height and percentage crown closure along with sufficient field measurements to determine cubic foot volume under local conditions. In addition, maps of watershed boundaries, rural fire district boundaries, and land ownership are used in the forest inventory classification.

Products

The dot counting procedure to determine forest acreages has been finished for Benson, Ramsey, Eddy, and Towner counties. The different maps described above have been completed.

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[1] North Dakota Forest Service, "Forest Resource Inventory", September 1976, unpaginated.

Title

Classification of Natural Ponds and Lakes

"Classification of Natural Ponds and Lakes in the Glaciated Prairie Region", by Robert E. Stewart and Harold A. Kantrud, U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Resource Publication 92, 1971.

Contact

None

Objective

To provide a classification system for natural ponds and lakes in the glaciated prairie region for research and intensive management.

Background

Investigations of wetlands conducted by the authors in central North Dakota from 1961 through 1966 indicated that the use of prairie ponds and lakes by waterfowl is related to a complex interrelation of factors such as water permanence, depth, chemistry, and land use. The authors determined that any marked variations are reflected in vegetational differences. These differences were used as the principal criteria in developing a classification system for ponds and lakes in the area. The above-referenced document supercedes a preliminary paper on the same subject (Stewart and Kantrud 1969).

A broad interpretation of the classification would correspond to the system of Martin et al. (1953) but is a more precise means of classifying wetlands in the glaciated prairie regions.

Description

For purposes of this classification, natural ponds and lakes refer to wetlands occurring in natural undrained basins or kettles. Ponds are defined as natural nonfluvial wetlands less than 50 acres in area; lakes are larger than 50 acres.

Wetland vegetation in prairie ponds and lakes is described by the following seven vegetational zones characterized by plant community structure or life form and a distinct assemblage of plant species:

- Wetland-low prairie zone
- Wet-meadow zone
- Shallow-marsh zone
- Deep-marsh zone
- Permanent-open-water zone
- Intermittent-alkali zone
- Fen (alkaline bog)—zone

Each vegetational zone is described in detail in the referenced publication.

Within each zone, characteristic plants may be found as a general mixture or may form one or more distinct associations composed of one or more species. The zones are related to differences in water permanence, modified by permeability of bottom soils and influence of ground water.

When wetlands contain two or more zones, one zone normally occupies the central, deeper part of the basin with the remaining zones forming concentric, peripheral bands. The presence or absence and distributional pattern of the zones are the primary factors used in distinguishing the major wetland classes.

The natural ponds and lakes of the glaciated prairie region are represented by combinations of classes, subclasses, and cover types. Seven major classes of wetlands are distinguished by the vegetational zone dominating the deepest part of the basin and occupying 5% or more of the wetland. The classes described are:

Class I - ephemeral ponds
Class II - temporary ponds
Class III - seasonal ponds and lakes
Class IV - semipermanent ponds and lakes
Class V - permanent ponds and lakes
Class VI - alkali ponds and lakes
Class VII - fen (alkaline bog) ponds

Plant species characteristic of these classes are listed in an appendix to the referenced publication and spatial relationships of vegetation zones and classes are diagrammed.

Five subclasses based on differences in species composition of plant communities within wet-meadow, shallow marsh, or deep marsh zones, are correlated with variations in salinity of the surface water:

Subclass A - fresh
Subclass B - slightly brackish
Subclass C - moderately brackish
Subclass D - brackish
Subclass E - subsaline

Principal species in subclasses of classes II, III, IV, and V of ponds and lakes are listed in an appendix to the publication.

Four cover types are designated based on differences in the spatial relation of emergent cover to open water or exposed bottom soil. The cover types are described and diagrammed in the referenced publication.

To use the classification system, each pond or lake can be classified by designating class, subclass (if differentiated), and cover type. The principal emergent species in the central vegetation zone and in other zones may be listed in parentheses. A small letter "t" superscript or large letter "T" may be used in the classification designation to represent cropland, disturbed land use conditions.

Related Systems

Wetland Classification in Western Canada (9002).

Title

(Classification of Range Resources)

"An analysis of State-Owned Rangeland Resources for Multiple-Use Management in Southeastern Oregon," by Charles E. Poulton and Arleigh G. Isley, Range Management Program, Agricultural Experiment Station, Oregon State University, August 1976.

Contact

Oregon Division State Lands
1445 State Street
Salem, Oregon 97310
(503)378-3805

Objective

To provide information on state-owned rangeland resources to the Oregon Land Board for management policies.

Background

The Oregon State Land Board is charged with the responsibility of managing state-owned rangeland held in trust for the Common School Fund. Information on the state rangelands was needed for development of management policies, and, in the 1960's, Oregon State University was commissioned to perform resource analysis of the rangeland.

The operational program was begun in 1967 and all field work was completed in 1968. Photo interpretation and statistical reporting was completed in 1969, and tract files and statistical summaries were delivered to the Division of State Lands in 1969. The above referenced report concludes the commitment of Oregon State University to the Board for presentation of the results of the resource analysis.

Description

The first step was a description of the state-owned tracts and procurement of existing aerial photography. Tract boundaries were located on the aerial photos. A 10% sample was selected for study for developing ecological legends and aerial photo interpretation guides. Field crews collected soil, landform and plant community data and the data were analyzed phytosociologically to determine plant community groupings. A mapping legend and symbolization system was then developed. A referenced set of aerial photo interpretation stereograms was developed for each plant community. With these aids, the remainder of the areas were analyzed. In addition to soil, vegetation, and resources, the interpreters also made statements about production and improvement potential, suitability for uses, probable range conditions, best routes of access and other management features. The survey was made with a consideration of all land uses (recreation, watershed, wildlife, timber products, or grazing).

The report summarizes the classification of range resources in State Lands in Eastern Oregon. Data are presented at four levels of generalization: 1) Ecological Province 2) Physical Land Features 3) Vegetation and 4) Ecological Unit with its distinctive plant community, topography, and soils (information at this level is in individual parcel folders where maps and legends show ecologically the kinds of land that make up each parcel).

Summaries are presented by Counties and by Ecological Province. Within the six Provinces are broad similarities in land and vegetation resources, and in management problems and potentials. Each of the six Provinces is described in an Appendix to the referenced document.

Products

The referenced report provides acreage summaries by County and Ecological Province of:

1) Geographical Distribution of Parcels
2) The "Kind of Land" on which ranges occur (15 subdivisions: e.g. bottomland-basin, fan or terrace, etc. - each described in an appendix)
3) Land Uses (7 subdivisions: e.g. range, cropland-irrigated, barren, etc.)
4) Vegetational Type (6 subdivisions: e.g. shrub, juniper, grassland, etc. - each described in an appendix)
5) Range Condition Class (excellent, good, fair and poor - each described in an appendix)
6) Potential for Improvement (medium and high for 6 uses, e.g. Range Seeding, Brush Control, etc.)
7) Physical Facilities (3 types: water development, roads and trails, fence)

Comprehensive statistical summaries are then provided for six counties giving existing acreages for land use, vegetation type, physical features, potential, and existing physical features (including a Timber Values category). A State summary of Retain-Dispose and Suggested Management Levels by County is included in the report.

A "Sample Contents of Parcel Folders" is included in the report and contains detailed resource analysis information.

Outputs of the study include a two volume statistical summary, individual parcel files, and aerial photo sets.

Title

(Habitat Types for Wildlife Inventory)

"Instructions for Use of Wildlife Resources Inventory Forms," Oregon Department of Fish and Wildlife.

Contact

Robert R. Maben, Staff Biologist
Wildlife Division
Oregon Department of Fish and Wildlife
1634 S. W. Alden Street
Portland, Oregon 97208
(503) 229-5454

Objective

To provide instructions for preparation of wildlife inventory forms.

Background

Vegetation classifications are used as a basis in wildlife resources inventory. The classification was developed with the aid of data in the California Department of Fish and Game planning guide and suggestions of Bill Anderson (Retired), SCS. The above referenced Instructions were prepared to guide employees of the Department of Fish and Wildlife who prepared maps of vegetation types in their areas. Data werethen collected on each type, i.e., acreage, ownership, land use, and species of wildlife.

The inventory is presently inactive. Original data were collected in 1970 and have not been updated.

Description

Thirty vegetation Habitat Types are listed under the six major categories of 1) Coastal Waters, Islands, and Wetlands 2) Inland Waters 3) Grasslands 4) Forest Lands 5) Agriculture Lands and 6) Nonwildlife Lands. Under each Vegetation Habitat Type, the instructions provide: a) description b) location c) climate, and d) value to wildlife.

Products

The instructions referenced above are used to complete Wildlife Resource Inventory Forms. The information on the forms is collected on the basis of habitat type by management unit for each county. If the study requires more detail, subtypes can be listed and a description of the subtypes provided. The system is amenable to computer storage of data.

Title

(Oregon State Park Master Plans)

"Compatible Land Uses," "Oregon State Park Master Plans," and "Master Planning," State of Oregon.

Contact

Richard I. McCosh, Parks Master Planning Supervisor
Parks Master Planning Unit
State Parks and Recreation Branch
Department of Transportation
525 Trade Street
Salem, Oregon 97310
(503) 378-6289

Objective

To prepare State Park master plans.

Description

The Parks and Recreation Branch of the Department of Transportation utilizes the following program outline for Oregon State Park Master Plans: 1) preparation of maps of park areas (air photos and topographic) 2) collection of resource data by contacting agencies and obtaining public input, and by site investigation 3) preparation of transparent overlay maps showing the relative importance of resource values and areas most suitable for development 4) determination of recreation needs and recreation activities compatible with the area 5) preparation of land use map showing most significant areas for resource protection and development 6) preparation summaries and plans for review and adoption of plans.

The following land use analysis items are shown on Master Plan Maps:

I. Resource Protection Areas - each of four resources (scenic, fish and wildlife, vegetation and special interests) are rated by one of three zones: significant, moderate, and little or no value. A brief description of zone criteria is provided in the "Master Planning" sheet referenced above.

II. Development Areas - three site factors of slope, drainage, and special problems, are rated by one of three zones: not favorable, moderately favorable, and very favorable. Brief descriptions of the zone criteria are provided.

Land use is divided into four major categories: Primary and Secondary Resource Protection, and Major and Minor development. A description of land use values and functions, and compatible recreation activities and developments is provided for each of these four categories.

Title

(USGS Land Use Classification)

"A Land Use and Land Cover Classification System for Use with Remote Sensor Data," by James R. Anderson, Ernest E. Hardy, John T. Roach, and Richard E. Witmer, Geological Survey Professional Paper 964, USDI Geological Survey, 1976, (Revised edition of Circular 671).

Contact

Charles Backlund, Planning Supervisor
Comprehensive Planning
Department of Game, Fish and Parks
Anderson Building
Pierre, South Dakota 57501
(605) 224-3394

Objective

To facilitate habitat management decisions and long range planning for wildlife population management.

Background

The Planning Section of the Division of Administration has been using the USGS system as outlined in Professional Paper 964 (012) for two years.

Description

The Division is concerned with determining wildlife species population information on a county by county basis. They are trying to determine if there is sufficient correlation between the animal population and the land classification data to justify comparison of each and to enable them to make valid assessments as to how annual trends and changes in habitat effected by land use influence certain animal populations.

Additional classification schemes may be used for specific research (e.g. on wetlands) in other divisions, but the Planning Section utilizes only the USGS system since that is the system used by the State Planning Bureau.

Products

The system is used in the development of comprehensive state management plans for wildlife.

Related Systems

Land Use and Land Cover Classification (012).

Title

Classification of Quaking Aspen Stands

"Classification of Quaking Aspen Stands in the Black Hills and Bear Lodge Mountains," by Keith E. Severson and John F. Thilenius, Research Paper RM-166, USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, April, 1976.

Contact

Dr. Keith Severson
USDA Forest and Range Experiment Station
Rapid City, South Dakota
(605) 343-0811

Objective

To inventory and classify aspen stands in the Black Hills and Bear Lodge Mountains, specifically to separate relatively homogeneous aspen groups from the larger heterogeneous aspen complex.

Description

The synecological units of aspen communities were determined by grouping sample plots into sets with similar vegetation, soil, and site attributes. Similarities were determined by computing a matrix of similarity and subjecting the matrix to cluster analysis techniques. The number of Aspen Groups was determined from results of the cluster analysis. Nine aspen groups were identified and described.

A discussion of the classification technique can also be found in Thilenius (May 1972).

Products

The classification scheme can be used as a tool for research and management. Representative stands can be subjected to further study or treatment and the results applied to an aspen group as a whole.

Title

Modified Ecoclass

"Ecological Land Units - Ecological Water Units", USDA Forest Service, Black Hills National Forest, Custer, South Dakota.

Contact

Jim Hagemeier, Resource Staff Officer
USDA Forest Service - Region 2
Black Hills National Forest
Custer, South Dakota 57730
(605) 673-2251

Objective

To delineate ecological land units and ecological water units for use in forest land management planning, environmental analysis of proposed activities and program planning.

Background

Region 2 of the USDA Forest Service has used a modified version of the Ecoclass system (USDA Forest Service, 1973: 003) to delineate ecological land units (ELU) and has recently begun to define ecological water units (EWU) as well. The classification system allows a manager the opportunity to make estimates of the biotic and physical responses of an area of land to proposed activities. The systems classification elements, vegetation, land form, soil and water, are visible and recognizable to all specialists as well as the general public. They offer a base by which technical and non-visible information can be inventoried and stored for later use. Based upon the information gathered, output coefficients can be predicted and constrained to formulate management options. The system also allows the manager a tool to program where activities may be carried out to achieve management goals and a general estimate of the constraints that may be foreseen as well as manpower costs.

ELU's or EWU's are hiearchical in nature and allow the manager to vary the size of the unit based upon his planning or evaluation need.

The system was developed in-house and has been used extensively for approximately one year. The system has been authorized for use throughout Regions 2 and 3 of the USDA Forest Service.

Description

Ecological Land Unit (ELU) is a mapping concept that delineates a unit of land that is relatively uniform throughout its extent, as characterized by a combination of vegetation and soils or vegetation and land form. The Black Hills National Forest has been divided into 62 ELU's delineated by vegetation and land form.

"The process of ELU delineation consists of interfacing existing land form or soils, and vegetative information using a series of separate overlays. The composite resulting from the overlay interfacing is the ELU map."[1] ERTS imagery, from June 22, 1973, enlarged to a scale of 1:250,000, was used as a base map for ELU delineation. The imagery allowed direct interpretation of topographic expression and gross vegetative differences at a scale which masks complex details.

The vegetation system of Ecoclass was classified at the series level. Criteria for the series unit were based on the climax overstory species and/or grass species which could potentially occur over the majority of the area delineated.[2]

Ecological Water Units are created by grouping stream and lake segments on the basis of shared basic characteristics. Characteristics considered are: 1) Order - climate latitude, and elevation 2) Class - integrates Socio-Ecological use of the water flow duration, and temperature fluctuation, 3) Family - integrates stream origination and corresponding chemistry, 4) Aquatic type association - integrates: gradient, substrate, velocity, alluvium, dynamics of chemistry and temperature, vegetation, etc., 5) Aquatic type - classifies productivity.

Ecological Water Units are links between the Aquatic and Land or soils systems (Aquatic: Order, Class, Family, Aquatic Type Association).

It is foreseen that the Ecoclass process could be used by Region II in the following assessments:

1) Area guides.
2) Forest land use plan - long range management plans; utilize ELU's described above and provide base for program planning information.
3) Unit plans - characteristic of each ELU (such as soil risk, visual quality, recreation value, wildlife habitat, timber value, etc.) are evaluated for use. Each characteristic has a rating scale and scale description.
4) Management unit plans - further subdivision of ELU's to provide more refined information, generally for functional planning.
5) Project plans - further subdivision of ELU's - data used in environmental analysis of proposed activities.

Products

A manual or complete written description of the system will be published by Regions 1, 2, and the Rocky Mountain Forest Research Station within one year. The output from the classification system will be retained in files and by computer storage.

Related Systems

Ecoclass (003).

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[1] Written description provided by contact, USDA Forest Service, Region II, Ecological Land Units - Ecological Water Units (unpaginated).

[2] Ibid.

[3] Ibid.

Title

(Wildlife Habitat Inventory)

Wildlife Habitat Inventory, Texas Parks and Wildlife Department, Austin, Texas.

Contact

Carl Frentress, Wildlife Biologist
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744
(512) 475-4877

Objective

To facilitate management of wildlife species within defined units of habitat (wildlife management units).

Background

The Texas Parks and Wildlife Department has been developing their habitat type mapping project for several years. The job is funded by the Federal Aid to Wildlife Restoration Program, Texas, Pittman-Robertson Project W-107-R. The project is designed to map the natural vegetation associations, urban developments, and agricultural lands throughout the state using LANDSAT data and computer analysis techniques. Techniques for producing ground cover maps compatible with current needs in wildlife management in Texas are being formulated.

Two biologists, Carl Frentress and Roy Frye, trained at a special workshop on remote sensing conducted by the Governor's Office of Information Services are responsible for coordinating input from the Wildlife Division field force and for performing the computer analysis. Project personnel are devising procedures to use in mapping every region of the state according to the results of a pilot study conducted in Travis County.

Significant references to the described system include Frentress and Fry (1975) and Texas Parks and Wildlife Department, Job Performance Reports (1975 and 1976).

Description

Class nomenclature will be specified for each type-map from an *a priori* statewide list of ground cover classes. This list contains 88 major types with the bulk of these being vegetation types presented in plant association terms. A proposed working definition of the plant association level is derived from Küchler (1967), Oosting (1956), and

Weaver and Clements (1938): "two or more dominant plant species growing together, exhibiting similar physiognomy, and generally characterizing the flora of the geographic area where they occur. At seral stages below climax, the prevailing plant species which typify the association will not be the climax dominants. Nonetheless, these species comprise the association type of the existing vegetation. A consociation is as above but only one plant species is dominant in the sere."[1] Criteria in terms of average height and canopy cover have been developed to define the various physiognomic categories (e.g. brush, parks, woods, forest). Thus nomenclature for a plant association label has two components: 1) floristics and 2) physiognomy. Definitions also are provided for nonvegetated classes.

Besides use on the map legends the plant association concept is utilized to specify ground truth for the training fields selected for use in signature development for the respective *a priori* classes. An organized scheme for ground truth acquisition on a statewide basis (but with respect to each LANDSAT scene) was developed through use of generalized type-maps prepared by district biologists for all Texas counties.

Aerial photographs, topographic quadrangle maps and county highway maps will be used to supplement on-site determinations of ground truth. Computer-associated analysis will delineate and classify ground cover.

Products

Vegetation type mapping was scheduled to begin in the Rio Grande Plains by late fall, 1975. Statewide completion of the job is projected for 1977. Program leaders will implement the next stage which will include stratifying wildlife data by vegetation types and making statistical tests to determine the extent of different populations.

Cartographic rendition of classified LANDSAT digital data has been resolved through the services of a commercial firm that offers a repeatable, versatile, and relatively inexpensive means of processing map products.

Final products will be base maps in 1:300,000 scale with color coded ground cover classes. Supplements to the map legends will describe each of the classes. The maps will contain 7 1/2 minute latitude-longitude tick marks imbedded in the map image. Such maps are intended to meet wildlife management needs and in addition may be used for general land use planning by the Parks Division and by extra-departmental users.

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[1] Job Performance Report, Federal Aid Project No. W-107-R-1, Wildlife Resource Planning, Job No. 1: Vegetation Type Mapping, October 16, 1975. Project Leader: Craig A. McMahon. Clayton T. Garrison, Executive Director, Texas Parks and Wildlife, Austin, Texas, Appendix A.

Title

(Utah Big Game Range Inventory)

"Utah Big Game Range Inventory," Publication Number 76-10, Annual Performance Report for Federal Aid Project W-65-R-D-24, Job A-6, State of Utah, Department of Natural Resources, Division of Wildlife Resources, 1975.

Contact

Catherine Harding, Information Specialist
Information and Education Section
Utah Division of Wildlife Resources
1596 West North Temple
Salt Lake City, Utah 84116
(801) 533-5081

Objective

"To determine vegetative types, composition, production, age and form class of vegetation on big game ranges; upper, lower, and lateral limits of big game winter and summer ranges; land ownership of big game ranges; trend of such ranges; and to evaluate habitat improvement projects."[1]

Background

The State Wildlife Management, Investigation and Survey, was completed in the State of Utah over the period September 1, 1974 to August 1, 1975. Six segment objectives are outlined, the first of which is "to conduct vegetative surveys to identify vegetative types, age and form class of vegetation, and determine forage production."[2] The remaining segment objectives concern the identification of summer and winter range and land ownership, map preparation, establishment of permanent transects, and determination of range trend.

The Utah Division of Wildlife Resources has been conducting annual big game range inventories since 1959. Survey results are published annually in the "Utah Big Game Range Inventory."

Description

Vegetative types are mapped on aerial photographs according to dominant overstory vegetation and uniformity of type. Vegetative types are then transferred to maps.

Field data are collected by a modified point method after the line intercept method described by Canfield (1941) and Hormay (1949). The stake point grid used in the line point method is after Coles and Pederson (1970). Classification of species into age and form classes follows the methods described by Patten and Hall (1966) and Cole (1959). Transects are laid out according to vegetative types determined from the air photos.

Observations during air reconnaissance and surveys are used to determine deer winter range limits. Information is also secured from the BLM, Forest Service and Division of Wildlife Resources.

Land ownership status is mapped from information obtained from various administrative agencies. Maps are prepared to indicate acreage/type of ownership.

Products

Output from the inventory includes maps, and numerical tables indicating browse ranking and cover, production, density and age class of selected grasses, forbs, and browse.

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[1] State of Utah, Department of Natural Resources, Division of Wildlife Resources, "Utah Big Game Range Inventory", Publication No. 76-10, Annual Performance Report for Federal Aid Project W-65-R-D-24, Job A-6, 1975, p. 1.

[2] Ibid, p. 1.

Title

Ecosym

"Ecosym, Progress Report 1 - A Classification and Information System for Management of Wildland Ecosystems: The Conceptual Framework", by Laurence S. Davis, and Jan A. Henderson. Department of Forestry and Outdoor Recreation, Utah State University, Logan, Utah. Sponsored by U.S. Forest Service, Surface Environment and Mining Task Force, Intermountain Forest and Range Experiment Station. January, 1976.

Contact

Ed Ryberg, Project Administrative Assistant
Utah State University
Department of Forestry and Outdoor Recreation
Logan, Utah 84321

Objective

To develop an information system for managers of terrestrial wildlands and water resources; to develop a comprehensive framework for classification and mapping terrestrial and aquatic ecosystems.

Background

Phase 1 of the development of Ecosym proceeded from identification of information requirements of users, to criteria for formulation of an ecosystem classification framework, to the computer and other means of delivering needed information to the manager in a useful form. Phase II is underway to test the concepts developed in Phase I. The approach of Ecosym is based on previous work on the Ecoclass system of land classification (Corliss and Pfister 1973;003).

Description

System design is as follows: identification of information needs by analysis of managers' questions, development of classification system, data collection, and processing for delivery to the manager. A major consideration in the design of the system is cost effectiveness.

Analysis of managers' questions involves a determination of the types of information needed to answer the questions acceptably. The system should be based on "clean components" of the ecosystem such as vegetation, soil, and climate, rather than on an integrated or partially integrated system. Components include topography, climate, lithology, etc. Each component has its own subcategories, often based upon existing classification schemes (such as 7th approximation for soils classifications). A discussion of the components is provided in the above-referenced interim report. The system attempts to encompass all important ecosystem components and provide for integration of components by users. The system does not attempt to answer the manager's questions, but gives him the components to use in forming an answer. The general features of the data base file structure follows from the function $(\chi_{me}) = F\ (\varepsilon_{ijk})$ where (χ_{ml}) = type of management information (m), at precision level (l); and (ε_{ijk}) = set of ecosystem classes by component (i) (soils, vegetation), hierarchical level (j) (levels of resolution), and class (k) (unique identification of an ecosystem component at a given level of resolution); and f = some functional relationship.[1]

The authors of Ecosym state that collection of the data should follow guidelines developed for each component. The system should be hierarchal with each level being an aggregation of only those classes immediately beneath. The system should also be objective, i.e., the delimitation of classes at any level in the multicomponent hierarchy should be based on objective and quantifiable criteria whenever possible.

Products

Phase II of Ecosym, which is now underway, will test the concepts developed in Phase 1. Data must be collected before the system can be operational. Storage and retrieval of information will be by a computer-based system using the classification framework as the basic structure. The system output should be in verbal, textual, tabular, and graphic format that corresponds to the managers' use of the information. The researchers hope to integrate Ecosym with the Forest Service COMLUP program which will allow production of overlay maps containing information on one or more Ecosym components.

Related Systems

Ecoclass (003).

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[1] L.S.Davis and J.A.Henderson. "Ecosym, Progress Report 1 - a Classification and Information System for Management of Wildland Ecosystems: The Conceptual Framework," Department of Forestry and Outdoor Recreation, Utah State University, January 1976, p. 52.

Title

GRIDS

"GRIDS works for DNR," by Roger A. Harding, State of Washington, Department of Natural Resources, Report No. 25, 1974.

Contact

Glenn A. Yeary, Forest Inventory Section
Division of Technical Services
Department of Natural Resources
Olympia, Washington 98504
(206) 753-5338

Objective

To provide a computerized data base system for managing the resources on state lands; "To provide reliable, current basic data, with convenient access, that can be used by all levels of management."[1]

Background

The GRIDS (Gridded Resource Inventory Data System) computer based system was devised in 1968 to replace the former Washington State Resource Inventory System which relied on hand-drawn, hand-corrected cover type maps to delineate the extent and status of particular resources. Reasons cited for abandoning the "type island" system include the expense of updating maps, interpreter subjectivity in determining type boundaries, and geographical limitations in the data base.

Description

GRIDS is a computer based data collection and analysis system which consists of integrating resource data from regularly spaced (every 10 acres) data points on lands managed by the Department of Natural Resources. Since the system is designed as a resource management tool directed primarily at timber harvest, the classification categories lie within a narrow field of interest, and are not stratified extensively; however the classification scheme is designed to accommodate all kinds of land use and cover types.

Functionally, the system relies on the ground collection of data from previously mapped points determined from aerial photographs and topographic maps. Sites are categorized both from aerial photo interpretation and from ground surveys. Although not presented as a hierarchical scheme in the publication, the system has the following implied levels:

1. Land Management Base. Broad classifications which include more detailed forest and non-forest types. Land Management Base groups are defined primarily by land use characteristics, (e.g. Grazing and Agriculture, Forest Land).

2. Cover Types. Cover types form a single, non-stratified class of categories which are differentiated by various combinations of the following characteristics:
    a. Location either east or west of the Cascades.
    b. Commercial species status (e.g. hardwood, conifer).
    c. Commercial harvest status (e.g. sawtimber, poletimber).
    d. Commercial potential based on accessibility and conditions favorable for growth.

Products

Products of the GRIDS system are computer maps which code on the basis of identified cover types within 10 acre areas. All data points are re-examined approximately every 10 years by means of new aerial photography and new ground surveys. Computer diskpacks carrying location and characteristics of each data point are updated as changes occur because of management actions or other massive causes such as forest fire or windstorm.

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[1] Roger A. Harding", GRIDS works for DNR", State of Washington, Department of Natural Resources, Report No. 25, 1974, p. 3.

Title

(The Columbia River Project)
(Federal, State, and local cooperative effort)

Contact

Washington Department of Game
600 North Capitol Way
Olympia, Washington 98504
(206) 753-5710

Objective

To inventory vegetation and wildlife along the Columbia and Snake Rivers (partial objective).

Background

The Columbia River Project is a cooperative effort among federal, state and local agencies. Selected sections of "Inventory of Riparian Habitats and Associated Wildlife along the Columbia and Snake Rivers" by Duane A. Asherin and James J. Claar, Idaho Cooperative Wildlife Research Unit, University of Idaho, which were provided by the Department of Game, Olympia, Washington, outline classification techniques used in Phase I of the Columbia River Project Wildlife Study. Phase II of the Project is now in progress.

Description

Vegetation types were delineated on black and white air photos using a format adapted from Poulton (1962). Test sites were selected to represent major vegetation types. Vegetation was then sampled along site transects. Data recorded included: complete site species list, density, mean height of woody species, soil information, slope and aspect, etc.

Computer processing was used to classify vegetation into vegetative communities which are defined as "recognizable aggregates of plant species within the vegetation types".[1] Classification was based upon frequency of species. References to computer processing techniques and criteria are included in the above-referenced document.

Plant communities were named by dominant species in each of three vegetative layers: trees, shrubs, and herbs. Criteria for dominance are outlined in the paper. Vegetative community names were based upon the common or scientific names of tree, shrub, and herb species. Two species names were used if the community consisted of only two layers. The codominant species name was used in the case of one-layer communities. A dichotomous key was developed to identify communities in the field.[2] A narrative description was written for each community type.

Wildlife is also inventoried using various techniques referenced or described in the above-referenced document. Techniques included aerial surveys, direct observation, presence of sign, trapping, etc.

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[1] D.A. Asherin and J.J. Claar, "Inventory of Riparian Habitats and Associated Wildlife Along the Columbia and Snake Rivers", Idaho Cooperative Research Unit, University of Idaho, (unpublished), p . 23

[2] Ibid, p . 24

Title

(Forest Inventory Study)

"Forest Inventory of Western Washington by Satellite Multi-Stage Sampling," by J.D. Nichols, Roger A. Harding, Robert B. Scott, John R. Edwards. (supported by contracts from the Pacific Northwest Regional Commission through the Forestry Task Force and Land Resources Inventory Task Force). Paper presented at the American Congress of Surveying and Mapping and the American Society of Photogrammetry.

Contact

Department of Natural Resources, Resources Inventory Section
Division of Technical Services
Olympia, Washington 98504
(206) 753-5338

Objective

To estimate the timber resources of Western Washington by multi-stage sampling by LANDSAT, aerial photos, and ground samples.

Background

The Forest Inventory Study is a demonstration and application project using multi-stage sampling as a means of applying ground data, aircraft photographic data and LANDSAT satellite remotely sensed data to estimate the timber inventory of forest lands in Western Washington. The study is being undertaken by the State of Washington, Department of Natural Resources, in conjunction with the Pacific Northwest Regional Commission, with support from NASA/AMES Research Center and the Department of Interior/EROS who are jointly interested in documenting the procedure, cost effectiveness, efficiency, and utility of the inventory method.

Description

Computer analysis classified every picture element of LANDSAT data within the project area into significant spectral classes. This was done by using multiple dates of close proximity of LANDSAT data and an integrated, supervised/unsupervised classification scheme where ISOCLAS and the LARSYS maximum likelihood classification algorithms were used.

Using photo interpretation and spectral data analysis, classes which are always the same between LANDSAT scenes or any subsets of scenes were identified and combined (e.g. water).

Interpretation of 3000 sample acres on low elevation aerial photography was used to determine the cover type for each of the computer classes. Other parameters were also determined by photo interpretation. The association of cover type to computer classes was aimed at stratifying the entire project area into five major cover types: 1) stocked young growth commercial conifer land 2) stocked commercial hardwood land 3) stocked old growth land 4) reproduction forest land 5) non-forest land. Three hundred of the photo interpreted samples were measured on the ground.

Products

The project output will include a step by step description of the techniques used, results obtained, and costs incurred. The results of the computer classification will be transformed to a ground coordinate system appropriate for photo reproduction and scale matching. Other tasks include the following statistical summaries and numerical analysis: 1) regression between photo and ground data 2) analysis of variance between photo and LANDSAT classes 3) analysis of photo categories versus LANDSAT computer categories, and 4) forest inventory statistics.

Title

(Coastal Zone Management Program)

"Final Guidelines, Shoreline Management Act of 1971," State of Washington, Department of Ecology, Olympia, Washington, June 20, 1972.

Contact

Miriam Laukers Office of Land Programs Department of Ecology State of Washington Olympia, Washington 98504 (206) 753-2800	(and)	Jon Gilstrom, Wildlife Project Leader Jack Howerton, Wildlife Project Leader Department of Game 600 North Capitol Way Olympia, Washington 98504 (206) 753-5710

Objective

To establish a coastal zone management program and guidelines to supplement the Shoreline Management Act and, as part of the program, to map wildlife habitats along marine shorelines.

Background

Washington's Shoreline Management Act of 1971 applies to all marine waters, and to streams and lakes over a certain size. Shoreline permits are required prior to development for all activities in or over water and for development within a 200 foot strip adjacent to water bodies.

Washington State, Department of Ecology has prepared guidelines to serve as the State's regulations to supplement the Shoreline Management Act until local shoreline management programs are completed and approved by the state. Local shoreline programs are prepared based on these guidelines.

As part of the coastal zone management programs, the Department of Ecology has contracted with the Department of Game to map inter-tidal and upland habitats for wildlife along marine shorelines. The Department of Game is presently preparing guidelines for wildlife mapping.

Description

The Final Guidelines, Shoreline Management Act, describe the following four basic shoreline classifications: natural environment, conservancy environment, rural environment, and urban environment.

The primary criteria in designating a natural environment area is the presence of some unique natural or cultural feature considered to be valuable in its original condition and which should be protected from intensive human use. These features should be defined, identified, and quantified in the shoreline inventory.

The objective of the conservancy environment designation is to protect, conserve, and manage existing natural, cultural, and historic areas to ensure continuous recreational benefits. Nonconsumptive uses of these areas are recommended.

Rural environment designations are intended to protect agricultural land from urban expansion, restrict intensive development along shorelines, and maintain open space. Land use in these environments is characterized by actual or potential intensive agriculture or recreational uses compatible with agricultural.

Urban environment designations are intended to ensure optimum utilization of shorelines in urban areas by providing for intensive public use. These shorelines should present few biophysical limitations for urban activities.

When preparing their own programs, local jurisdictions used all of the above described classifications and often expanded their classification to include additional categories.

As part of the coastal zone management program, the Department of Game is investigating various classification systems for mapping wildlife along marine shorelines. Classification systems which may serve as a basis for their system include the Florida Land Use/Cover Classification System (a derivative of the U.S. Geological Survey System;012) and the U.S. Fish and Wildlife Wetlands System (011).

Products

Local areas are responsible for preparing local shoreline management programs which are approved by the State of Washington.

The Department of Game has not yet completed a classification system for wildlife mapping purposes. Further information can be obtained by contacting the Departments of Ecology and Game in the State of Washington.

Title

(Private Forest Land Grading Procedures)

"Private Forest Land Grading Procedures Manual", State of Washington, Department of Natural Resources, Technical Services Division, January 1977.

Contact

Arden Olson, Program Manager
Private Forest Land Grading Section
Technical Services Division
Department of Natural Resources
100 Capital Center Building
Olympia, Washington 98504
(206) 753-3841

Objective

To survey soil and measure tree site index to determine the productivity potential and operational limitations on all privately owned forestland in Washington. The data will be used by the State Department of Revenue and the county assessors as the basis for taxing forestland in the State.

Background

In 1974, the Washington State Legislature amended the Forest Tax Law giving the responsibility to the Department of Natural Resources to field inventory privately owned forestland and determine the productive potential and operational limitations of these lands. To determine the productive potential and operational limitations, it was decided that a detailed soil survey and site index determination would be made on the approximately 9 million acres. The Department of Natural Resources entered into a cooperative agreement with the USDA Soil Conservation Service and Washington State University to complete the soil survey under the standards of the National Cooperative Soil Survey Program.

Description

The Private Forest Land Grading inventory procedures are designed to capture for each soil mapping unit the commercial timber species most adapted to the unit, the site index to a ± 5 feet, the operability rating, and the acreage of the unit. In addition, a soil series and mapping unit description will be prepared which will document the properties of the soil, the landscape setting, the understory vegetation, the forest management opportunities and limitations, etc.

The soil landscape units will be delineated stereoscopically on 1:12000 or 1:24000 scale aerial photos and field verified. The aerial photo soil mapping delineations, the species adapted to the site, the site index, the operability grade, and acreage will be compiled from the aerial photos to 1:12000 scale orthophotos 1/4 township in size.

The soil mapping units will also be produced on 1:24000 scale orthophotos for publication in standard Soil Conservation Service soil survey reports.

The land grading productivity and operability map as well as the soil survey maps will be digitized for future use by landowners and government agencies, and for future analysis and research by industry and universities.

Products

Contact the Department of Natural Resources, Olympia, Washington for information concerning available products.

Title

(Forest Survey Project)

"Forest Survey Field Instructions," prepared by Forest Economics, Recreation, Engineering, and Utilization Research, USDA Forest Service Intermountain Range Experiment Station, Ogden, Utah, May 1966.

Contact

Land Office
State Capital
Cheyenne, Wyoming 82002
(307) 777-7586

Objective

"To provide the resource data needed to develop economically and silviculturally sound timber management plans and action programs to meet present and anticipated future demands for timber".[1]

Description

Field inventory procedures for use by the Forest Survey Project of the Intermountain Forest and Range Experiment Station in conducting the Forest Survey and related timber inventories are outlined in the handbook cited above. These procedures are generally followed by Regions 1, 2, 3, and 4 with supplements according to their individual management needs. Development of these procedures is to assure uniformity of basic concepts and definitions in inventory work, comparability of resource statistics needed for national and regional appraisals of the timber situation, and improved efficiency in the compilation of statistics from the Forest Survey and other inventories.[2]

Three ground land-use classes are defined: commercial forest land, noncommercial forest land, and nonforest land. Classification is based on the land use in which the center of the location falls. Forest land is defined as land at least 10 percent stocked by forest trees, or formerly having such tree cover, and not currently developed for nonforest use. Nonforest land includes land that has never supported forest growth or land that at one time supported forest but now is developed for nonforest use such as crops, pasture, and residential areas. Commercial forest land includes forest land which is producing, or is capable of producing, crops of industrial wood and are not withdrawn from timber utilization by statute or administrative regulation. Noncommercial forest is defined as unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions and productive forest land withdrawn from commercial timber use through statute or administrative regulation.[3]

Products

Surveys of National Forest land are generated according to these instructions, methodology, and techniques described in detail in the referenced handbook.

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[1] Forest Economics, Recreation, Engineering, and Utilization Research, "Forest Survey Field Instruction", USDA Forest Service Intermountain Range Experiment Station, Ogden, Utah, May 1966. p. 1.

[2] Ibid, p. 1.

[3] Ibid, p. 8.

Title

(Big Game Winter Range: Inventory and Analysis)

"Big Game Winter Range: Inventory and Analysis," Wyoming Game and Fish Commission, Cheyenne, Wyoming (document is published upon completion of an Inventory).

Contact

Wyoming Game and Fish Commission
500 Bishop Boulevard
Cheyenne, Wyoming 82001
(307) 777-7604

Objective

To determine carrying capacity of land for big game, and to facilitate management of big game herds.

Background

The Wyoming Game and Fish Commission has two inventory methods in use. The Research and Development Section has employed a system for six years as outlined in the Procedure and Development Planning Manual. Dale Strickland of the Planning Division is developing a system based on population distribution patterns.

Description

The system employed by the Research and Development Section is based on the cover type system of the USDI Bureau of Land Management and the soils classification of the USDA Soil Conservation Service with a few minor modifications. Data are used to determine the carrying capacity of numerous discrete areas (primarily critical breeding areas, etc.) throughout the state.

The system developed by Strickland attempts to define, for the entire state, sizes and seasonal movement patterns of all big game herd units based on collection of population distribution patterns. Approximately 200 herd management units - delineated according to herds - for the various species will be developed based on these data. Management of each herd will be done by a single individual, thus alleviating the problem of herds being managed by people in more than one jurisdictional area when they cross geographic management unit boundaries. Total management includes use of a population simulation model and overlay maps to determine total wildlife use in any area. This will allow identification of heavily used critical habitat areas in the state. A techniques manual for this system is presently being developed.

Products

Products of the inventory system used by the Research and Development Division are the "Inventory and Analysis" documents cited earlier. No products have yet been generated by the Planning Division methodology.

Title

(Forest Vegetation)

"Forest Vegetation of the Bighorn Mountains, Wyoming: A Habitat Type Classification," by George R. Hoffman and Robert R. Alexander, USDA Forest Service Research Paper RM-170, August 1976.

Contact

None

Objective

"To identify and describe forest habitats of the Bighorn Mountains; to describe successional patterns of forest vegetation; to relate topographic and edaphic factors to the habitat types; and to relate Bighorn habitat types to those of surrounding areas."[1]

Background

Professor Hoffman initiated a detailed study of the forest vegetation of the Bighorns in 1972 under a cooperative agreement with the U.S. Forest Service Region 2 and the Rocky Mountain Forest and Range Experiment Station. Results of the study as published in the above referenced document are intended for forest managers in need of a working tool for use in the Bighorn Mountains, and for ecologists in need of a research tool for use in related studies.

Description

The habitat type classification (Hoffman 1975) is based on concepts and methods developed by Daubenmire (1952) and modified and extended by Daubenmire and Daubenmire (1968), Reed (1969), Pfister and others (1974), and Wirsing and Alexander (1975).

A habitat type classification of forest lands involves the recognition and description of vegetation dynamics and their expressions. Vegetation is considered the major component of the scheme since habitat types can be readily recognized by their climax, or potentially climax, vegetation. Mapping of recognizable land units which have significant similarities and/or dissimilarities is facilitated by the identification of habitat types. The habitat type approach system uses indicator species to signify important differences among ecosystems.[2]

The following terms are recognized: *Climax vegetation* is "that which has attained a steady state with its environment; species of climax vegetation successfully maintain their population sizes."[3]

Seral communities are "stands of vegetation that have not attained a steady state; current populations of some species are being replaced by other species."[4]

A single *plant association* is comprised of all stands of climax vegetation that have the same overstory and understory dominants. *Series* consist of a group of plant associations with the same overstory (climax) dominants.

A *habitat type* is "that land area which either supports, or has the potential of supporting, a single plant association."[5]

Habitat type is defined as the basic unit in classifying natural vegetation. The next higher category of classification is *series*. Hoffman describes their relationship as follows: "For example, all habitat types with *Pinus ponderosa*, the climax dominant, are grouped into the *Pinus ponderosa* series. The series is more than an artificial grouping of vegetative types using the climax dominant as the convenient thread of continuity. There is ecologic basis for grouping vegetation types into series as defined here. For example, *Pinus ponderosa* occupies areas that are warmer and drier than areas where *Pseudotsuga menziesii* is climax. Continuing higher into the mountains, *Pinus contorta*, *Picea engelmannii*, and *Abies lasiocarpa* successively become the dominant species. In the absence of concrete data for the Bighorns, it is assumed that these self-perpetuating populations of dominant trees are related to the macroclimate, whereas the understory vegetation is related more to microclimate and soils. Stands in a series have the same general appearance whether they are in the Bighorns or in nearby forests of Wyoming, southern Montana, and western South Dakota. Habitat types within a series are differentiated on the basis of understory vegetation."[6]

Products

A key to identify the habitat types and associated management implications is provided in the publication cited above.

Related Systems

Forest Vegetation Classification--Daubenmire (016).

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[1] G.R. Hoffman and R.R. Alexander, "Forest Vegetation of the Bighorn Mountains, Wyoming: A Habitat Type Classification," USDA Forest Service Research Paper RM-170, August 1976, p. 1.

[2] Ibid, p. 24.

[3,4,5,6] Ibid, p. 3.

Title

(Coldwater Stream Classification for Wyoming)

"Coldwater Stream Handbook for Wyoming." USDA Soil Conservation Service, Casper, Wyoming, 1976.

Contact

George Dern, State Biologist
USDA Soil Conservation Service
Box 2490
Casper, Wyoming 82601

Objective

To develop an aquatic and riparian habitat quality rating system for use by Wyoming SCS professionals. It was designed to provide a rapid, easily applied methodology for evaluating trout stream quality, and to be quantitative for the purpose of repeatability.

Background

This stream rating system was developed from a literature review and field experience by Wyoming SCS personnel.

Description

This system consists of three classification components for habitat quality: aquatic, riparian wildlife habitat, and recreational and aesthetic potential. Each component consists of measurable or subjective parameters which are rated by condition (good, fair, etc.). A narrative definition and a numerical score is provided for each condition class. A maximum score of 10 can be achieved by each component, or a maximum of 30 for all components together.

The primary parameters rated for the aquatic component are pool-riffle ratio, stream depth and width, and aquatic cover (rocks and logs).

Riparian terrestrial wildlife habitat is classified into four quality classes which are defined by the height and density of woody vegetation.

Recreational and aesthetic quality for a stream is assigned to rating classes on the basis of water quality, water flow, adjacent terrestrial flora, aesthetic appearance, distance from a source of users, and distance from roads.

Products

This system has been applied by SCS field personnel in Wyoming for watershed evaluation projects. Further information on the system can be obtained by contacting the SCS in Casper, Wyoming.

Wyoming 1605

Title

(Habitat Quality Index for Wyoming Trout Streams)

"Evaluation of Habitat Quality in Wyoming Trout Streams", by Allen Binns, Habitat Biologist, Wyoming Game and Fish Department, Resume of a paper presented at the annual meeting of the American Fisheries Society, Dearborn, Michigan, September 19-24, 1976.

Contact

Robert Pistono
Wyoming Game and Fish Department
Lander, Wyoming
(307) 332-2688

Objective

To rate Wyoming stream habitat quality in relation to trout standing crop.

Background

"In response to federal requirements for non-monetary evaluation of water development projects, as promulgated by Water Resources Council (1973), a rating system has been developed to quantify habitat quality in trout streams. Criteria developed from the literature were used to describe 21 environmental attributes believed to be important determinants of habitat quality in Rocky Mountain trout streams."[1] Plotting field data for habitat quality parameters against trout standing crop for several sites indicated a high degree of correlation between trout biomass and 10 habitat attributes. A predictive model of habitat quality, the Habitat Index, was developed from these 10 attributes. In addition, a standard definition of a trout habitat unit was developed which is defined as "the amount of habitat quality required to produce an increase in the trout standing crop of one pound per acre (or one kilogram per hectare)".[2] The value of a given habitat was then expressed in terms of this standard habitat unit.

Description

The Habitat Quality Index consists of the following ten factors: critical period stream flows, annual stream flow variation, maximum summer stream temperature, water velocity, cover, stream width, food abundance, food diversity, nitrates, stream bank stability. Five rating classes are provided for each factor. A narrative definition is provided for each rating class, as well as quantitative ranges for certain factors when quantitative data are required. Implementation of this method requires considerable professional experience and must be applied during periods of low stream flow. "The habitat evaluation system outlined above is specific for front waters in Wyoming, but the system would probably be usable in other Rocky Mountain states having similar stream habitat types."[3]

Products

Maps showing ratings for Wyoming streams analyzed by this system are currently under development by the Wyoming Game and Fish Department.

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[1] A. Binns, "Evaluation of Habitat Quality in Wyoming Trout Stresms", Resume of a paper presented at the annual meeting of the American Fisheries Society, Dearborn, Michigan, September 19-24, 1976. p. 1.

[2] Ibid. p. 3.

[3] Ibid. p. 12.

Title

(Valley Bottom Classification)

"A Systematic Approach to the Stratification of the Valley Bottom and the Relationship to Land Use Planning", by Albert W. Collotzi, Bridger-Teton National Forest, Jackson, Wyoming.

Contact

Albert W. Collotzi, Fishery Biologist
Bridger-Teton National Forest
Jackson, Wyoming 83001

Objective

To stratify the valley bottoms into identifiable units of land that are mappable, describable and predictable.

Background

In 1974 the author, along with other Interdisciplinary Team members on the Bridger-Teton National Forest, developed a system of classifying the Valley Bottom land form (Collotzi 1975). The system has since been enlarged to include both the abiotic and biotic environments; in addition, it is interrelated and compatible with the present Land Systems Inventory (002).

Description

The valley bottom is defined as that area of land that has been formed by water related processes, glacial activity, and/or may be influenced by the present stream. The system involves the systematic stratification of the valley bottom into recognizable units of land according to a hierarchical system which meets various planning or decision needs depending upon the degree of detail.

The proposed hierarchical system is comprised of four levels from the general category of subsection to the more specific level of Valley Bottom Phase. Subsection (Level IV) is basically a geological classification including major lithological areas such as granite, hard and soft sedimentary formations, gross morphology, and different kinds of processes. Valley Bottom Association (Level III) is the most important level in the hierarchical system and is based on the stream gradient. Valley Bottom Type (Level II) is comparable to the concept of landtype described by Wertz and Arnold (1972). This level includes a group of land types within a valley bottom, such as streams, lakes, terraces, and alluvial fans. Valley Bottom Type Phase (Level I) is the lowest level for collection and development of planning information and may be identified using abiotic characteristics such as kinds of soil(s) or bedrock or by using biotic characteristics such as habitat type in the sense of Daubenmire (1968).

The Valley Bottom concept also provides a method for incorporating instream flow needs into the land use planning process at several levels of planning. Collection of data at these levels - Valley Bottom Association, Valley Bottom Type and the Valley Bottom Type Phase - is achieved by the Transect Method as described in "The Transect Method of Stream Habitat Inventory - Guidelines and Applications" by Dunham and Collotzi (1975). A computer program has been developed, General Aquatic Wildlife System (Collotzi and Munther 1975), which complements this method of inventory. The intensity of the inventory is determined by the level of planning.

Products

Information on the system may be obtained from contacting the author.

SECTION III

NON-U.S. SYSTEMS

(ALBERTA AND MANITOBA, CANADA)

Title

Canada Land Inventory

"The Canada Land Inventory: Objectives, Scope and Organization," Report No. 1, by Department of Regional Economic Expansion, 1970.

Contact

Richard Goulden
Manitoba Department of Renewable Resources
Winnipeg, Manitoba Canada
(204) 786-9438

Objective

To complete a comprehensive land use and land capability survey as a basis for land use and resource planning for agriculture, forestry, recreation, and wildlife.

Background

A comprehensive survey of land use and land capability in Canada was recommended by the Senate Committee on Land Use in 1958 and by the Resources for Tomorrow Conference in 1961. Based upon these recommendations, the federal government initiated the Canada Land Inventory program under the Agricultural and Rural Development Act (ARDA) in 1963. Classification systems were prepared by federal and provincial resource planners.

The inventory covers approximately one million square miles including all Atlantic Provinces, and the settled portions of Ontario, Quebec, and the Western Provinces. Provinces carry out the work within their own boundaries with coordination through federal resource departments. The Department of Regional Economic Expansion provides funds for additional costs to all participating agencies.

Description

The Canada Land Inventory covers agriculture, forestry, recreation, wildlife waterfowl, wildlife ungulates, and land use planning. The following mapping classifications are specified for the Inventory:

Agriculture: Agricultural maps show the potential of specific areas for agricultural production. Classes and subclasses are indicated according to the Soil Capability Classification for Agriculture which is based on soil surveys.

Mineral soils are grouped into 7 classes and 13 subclasses according to the potential of each soil for crop production. Organic soils are shown as a separate unit. The seven soil classes indicate the degree of mechanized agriculture limitation imposed by the soil with Class 1 having no limitations and Class 7 considered unsuitable for agriculture. The subclasses indicate limitations that individually or in combination affect agricultural land use. Subclasses include climate, erosion damage, low fertility, etc.

Forestry: Land capability for forestry is based on a national classification. Seven classes are used to rate the land in its natural state according to its capability for growing commercial timber in areas stocked with the optimum number and species of trees. Class 1 represents the best land for tree growth, and Class 7 land cannot yield commercial quantities of timber.

Forestry land capability is mapped from air photos and field surveys. Information on subsoil, soil profile, depth, moisture, fertility, landform, climate, and vegetation is used to determine the land units.

Mapping symbols provide information on proportion of a class in the unit, a capability subclass indicating environmental limitations, and the species likely to yield the volume of timber associated with the particular class.

Recreation: The main objective of the Recreation maps is to estimate the quantity, quality, and location of outdoor recreational lands in settled portions of Canada for planning recreational use. Seven classes are specified with Class 1 representing very high capability and Class 7 representing very low capability.

The basis of the classification is the quantity of recreational use a land unit can withstand without undue deterioration of the resource base. Subclass symbols on the maps represent the major recreational use of the land (e.g. beach, angling, etc.).

Wildlife waterfowl and Wildlife ungulates: The wildlife classification was developed with the assistance of the Canadian Wildlife Service. Seven classes are specified for waterfowl and for ungulates based on the capability of the land to provide sufficient quantity and quality of food, protective cover, and space for survival, growth and reproduction of wildlife.

Capability is mapped by air photos and field surveys. Classification of a unit is based on the natural state of the land with feasible wildlife management practices. Class codes represent the degree of limitation for wildlife, and subclass codes indicate the factors causing the limitation. On the ungulate maps, letter symbols represent the species to which the classification refers.

Land use planners can integrate the physical capability maps with mineral, water, and socioeconomic information for land use planning purposes. The integration points up areas where resource use conflicts may exist or where multiple use may be possible. The combination of capability maps can provide a guide for regional resource development.

Products

Maps are prepared at two scales. Maps at 1:50,000 scale are used as the basic documents for planning and are available from the provinces. Except for present land use, data are plotted on maps of 1:250,000 scale and published by the Department of Regional Economic Expansion. The maps contain the symbols specified above for each capability sector and are color coded for easy reference. A central computerized data bank has been set up for all map data and related information. Retrieval of data in all areas will be possible when the system is fully operational.

Further information may be obtained by contacting Mr. R.J. McCormack, Director General - Lands Directorate, Department of the Environment, 20th Floor, Place Vincent Massey, St. Joseph Blvd., Hull, Quebec, Canada.

Title

(Wetland Classification in Western Canada)

"Wetland Classification in Western Canada", by J.R. Millar, Canadian Wildlife Service, Report Series Number 37, (date unknown).

Contact

Canadian Wildlife Service
Room 1110
10025 Jasper Ave,
Edmonton, Alberta, Canada T5J156
(403) 425-6860

Objective

To provide a convenient guide for land use investigators which will aid in classifying wetlands.

Background

The wetland classification presented by Millar incorporates many vegetation criteria used in earlier classifications with modifications to improve interpretation of current water regime. The system is based on data obtained during a ten-year study of 103 wetlands at three locations in Saskatchewan. Features related to wetland vegetation and wetland physical characteristics are used as classification criteria in the system. This publication is one document being used as a base for ongoing investigations for habitat classification in the Canadian Wildlife Service. The system presented is currently being revised.

Description

Wetland vegetation is divided into the following seven categories or zones according to species composition, stability, and gross appearance:

- Wet Meadow
- Shallow Marsh
- Emergent Deep Marsh
- Transitional Open Water
- Shallow Open Water
- Open Alkali
- Disturbed

The first five zones represent a gradient of increasing depth and duration of flooding while the last two represent extreme salinity and disturbance, respectively.

The author has defined and named (with one exception) the wetlands in terms of the vegetation zone which occupies the central or lowest portion of the depression. Wetlands having a central shallow open-water zone are further divided into open-water marshes or shallow open-water wetlands according to the proportion of the wetland occupied by the shallow open-water zone. Millar's definitions of the vegetation zones follow those of Stewart and Kantrud (1971). Plant species forms can be associated with depth and duration of flooding and therefore are useful for dividing vegetation into zones indicative of particular moisture regimes.

The vegetation zones are described and assigned code numbers and descriptions of associated moisture regimes are provided in the publication. Four of the seven vegetation zones are recognized by their distinctive emergent vegetation and the remaining three zones by the presence of open water.

Code numbers and descriptions are also provided for the following additional criteria used to modify the seven vegetation zones: extent of central vegetation zone, density of central cover, extent of central cover density, origin of cover density, and salinity.

Physical features of size, basin depth, and position in watershed are less changeable than vegetation and provide a more reliable indication of a wetland's long-term potential value and are therefore also used as criteria in the classification system. A discussion of physical feature modifiers with assigned code numbers for wetland size, basin and wetland depth, position in watershed, and origin and alteration of wetlands is provided in the referenced publication.

Products

The system is designed for computer storage and retrieval of information. The various criteria can be combined in many ways for use on particular projects. Additional research is being conducted by the Canadian Wildlife Service and revisions/modifications of this system are being made. Further information can be obtained by contacting the Canadian Wildlife Service, Edmonton, Alberta, Canada.

Related Systems

Classification of Natural Ponds and Lakes (North Dakota 1002).

Title

(Biogeoclimatic Zones)

"Biogeoclimatic Zones of British Columbia," by V.J. Krajina, University of British Columbia, Canada, 1976.
"Ecosystems in Forestry," by V.J. Krajina, address delivered at the University of British Columbia, March 15, 1972.

Contact

Environment Canada
Canadian Forest Service
Northern Forestry Research Center
Edmonton, Alberta, Canada
(403) 435-7210

(and)

Dr. V.J. Krajina
Botany Department
University of British Columbia
Vancouver, British Columbia, Canada

Objective

To provide a guide for forest managers in planning mixtures of tree species for given areas.

Background

The Northern Forestry Research Center of the Canadian Forest Service is interested in a classification system entitled Biogeoclimatic Zones of British Columbia devised by Dr. V.J. Krajina at the University of British Columbia. The biogeoclimatic classification is based upon biota and soils which are products of geological parent material, organisms, topography affected by climate, and time. Ecological information on the biogeoclimatic zones can be used by forest managers for developing forest lands where stands are being harvested or removed by natural disasters.

Description

The Province of British Columbia is divided into twelve biogeoclimatic zones which are subdivisions of four biogeoclimatic formations and seven biogeoclimatic regions. Each of the categories is described in the above-referenced publication by climate, elevation, and vegetation criteria.

In addition to biogeoclimatic zones, Dr. Krajina has included biogeoclimatic subzones in a diagrammatical representation of the classification in the second referenced document. The diagram references Köppen's climatic symbol for each biogeoclimatic formation, region, and zone and lists "major cause" for each subzone. Identifying symbols are provided for each category in the classification.

Products

The Canada Forest Service, Northern Research Center, is interested in this system but has not adopted it; therefore no products are available from the Forest Service. Information on products may be obtained by contacting Dr. Krajina.

Title

Biophysical Land Classification

"Biophysical Land Classification", prepared by Canada - Manitoba Soil Survey for Province of Manitoba, Department of Renewable Resources and Transportation Services.

Contact

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Province of Manitoba
Department of Renewable Resources and Transportation Services
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(204) 786-9540

Objective

To classify and map terrain in terms of landforms and surface deposits, vegetation, soils, drainage, permafrost, associated aquatic systems, and climate to provide an ecologically sound basis for making land use decisions.

Background

The Manitoba Department of Mines, Resources, and Environmental Management initiated the Northern Resources Information Program (NRIP) in 1974 to meet the need for basic resource data for planning. The data are useful for planning for the development of renewable and nonrenewable resources on a regional basis, for planning for industrial and community development, for the protection of the environment, etc.

In the first year, a biophysical classification system and systematic survey system were developed for northern Manitoba. The objective of the survey was to classify the land into ecologically significant land units. A Guide to Biophysical Land Classification accompanies maps and legends produced in the NRIP program.

Description

Prior work in Canada has led to a relatively uniform methodology for bio-physical classifications. The approach taken by Manitoba is based on the Lacate (1969) system which consists of four hierarchial classification units:

1) Land region - land area with distinctive regional climate expressed by vegetation.
2) Land district - land area with distinctive pattern of relief, geology, geomorphology, and associated vegetation.
3) Land system - land area with recurring pattern of landforms, soils, and vegetation.
4) Land type - land area on particular landform segment having a fairly homogeneous combination of soils, and chronosequence of vegetation.

All four levels are used in Manitoba with some modification of the Land Region definition. The basic product of the bio-physical classification is a map of Land Systems at a 1:125,000 scale. Ground truthing is carried out to the Land Type level. Land System units have been grouped into Land Districts which are in turn subdivisions of Land Regions.

The definition of Land Regions has been expanded to include vegetation, trends in soil development, and permafrost features, in addition to climate. Land Regions describe broad areas with the same kinds of vegetation and soil associations on similar sites. The Land Region boundaries are delineated where change in climate-soil-vegetation conditions are most pronounced compared to adjacent areas. A particular soil name or vegetation type may be applied to either side of a Land Region boundary if similar conditions exist.

Products

The NRIP Area has been divided into 5 Land Regions. Tables in the Guide to Biophysical Land Classification provide selected information on vegetation, soils, landforms, regime, permafrost conditions, and climate for each of the Regions. Preliminary maps and legends are available for two areas in Northern Manitoba: Hayes River and Kettle Rapids. Land Districts are delineated and described and Land Systems are delineated on a map at a scale of 1:125,000. Accompanying legends provide coding symbols for geomorphological features and soil and vegetation characteristics.

Title

(Forest Cover Classification)

"Forest Cover Map Specifications, Phase 3 Inventory " (draft)
Department of Energy and Natural Resources, Alberta Forest Service,
Timber Management Branch, August 25, 1976.

Contact

Alberta Forest Service
Timber Management Branch
Alberta Energy and Natural Resources
Edmonton, Alberta, Canada T5K 2E1
(403)427-3494

Objective

To prepare specifications for forest inventory mapping.

Background

Forest inventory mapping in Alberta began with the Broad Inventory of the early 1950's with a Detailed Inventory following in the late 1950's and early 1960's. Phase 3 Inventory began in the early 1970's. Phase 3 draft inventory specifications have been prepared and will be finalized after review and editing. Other special forest inventory map series have been developed over the years for special purposes.

Description

Forested lands are classified into nine categories of non-productive forest land (e.g., sand, muskeg, etc.) and productive forest land. Productive forest is further classified into non-stocked productive forest and stocked productive forest. A basic four-part legend (density, height, composition, and commercialism) is given to every stocked productive forest. Other forest characteristics such as origin, site, slope, disturbance, condition, and understory may be noted. A system of recognizing watersheds is being developed. Specifications for categorizing forest characteristics are outlined in the referenced document.

Products

Forest inventory maps are prepared at a scale of 2" to 1 mile. Mapping symbols and codes for forest characteristics are provided in the specifications.

CLASSIFICATION TERM GLOSSARY

Abiotic - pertaining to non-living factors.

Aquatic - pertaining to water based ecological systems.

Aspect - direction of the exposure of a slope face.

Association - a characteristic assemblage of plant species living together as an ecological unit. Usually named in terms of the dominant overstory and understory plants.

Biota - all life of a region.

Biotic - pertaining to all living components (organisms).

Category - a member of a group of items existing at the same level of abstraction or resolution in a classification system.

Climax Plant Community - a plant community which is in relative equilibrium with its environment and which is self-perpetuating under the existing environmental conditions.

Community - an aggregation of all plants and animals within a specified region of space and time.

Dominant Species - a species which within a given region: a. is large in size; b. strongly influences the microclimate of other species; or c. controls the flow of mass or production.

Ecosystem - the interaction of all abiotic and biotic components within a region of space and time.

Ecosystem Components - environmental subdivisions which are separated for convenience for study. Examples include soils, vegetation, landforms, and wildlife (structural); trophic levels, herbivores, carnivores, and decomposers (functional).

Edaphic - pertaining to the physical and chemical characteristics of the soil or soil moisture.

Environment - all external influences on the development of an organism or group of organisms.

Equilibrium - the condition in which a community composition is maintained with little fluctuation over an extended period of time.

Fauna - animal species found within a specified area.

Flora - plant species found within a specified area.

Forest Type - a forest community essentially homogeneous in composition and development. Usually considered a collection of stands which are discrete and more homogeneous internally.

Habitat - the environment satisfying the life support needs of an organism or group of organisms.

Habitat Type (Vegetative) - an environment supporting, or capable of supporting, a particular climax plant community and named for the climax plant association.

Hierarchical Classification - a grouping of units into categories according to a definite ranking scheme with two or more levels of generality. Each higher level is an aggregation of lower, more specific levels.

Inventory - a survey for the purpose of defining the location and abundance of the biotic and abiotic constituents of an area.

Land Cover - the existing surface features of a geographic unit or land area.

Land Use - the particular activity supported by a land area or purpose served by a land area at any given time.

Land Use Capability - the appropriateness of a specific land use on a given land unit, or the most appropriate land use.

Level - a group of items which exists on the basis of common characteristics at the same position in a classification scheme, and may either be subdivided into more specific categories, or aggregated into more general categories. In a classification system, units of similar abstraction or resolution, and distinguished from each other by the same number of decisions.

Multiregional Application - considering more than one recognized multistate region, but less than the entire nation.

Natural Area - an area free of significant human intervention or influence.

Overstory - the highest vertical relatively continuous layer of vegetative cover; e.g. the forest canopy in a forest system or a shrub canopy in a scrub system.

Physiognomy - the outward appearance of a community determined by gross morphology of the dominant plant species and their leaf longevity.

Rangeland - land where the actual or potential natural vegetation is predominantly grasses, forbs, and/or shrubs.

Regional Application - involving more than one state and less than about 1/4 of the nation's area.

Remote Sensing - a method of determining characteristics or properties of an area or object without direct contact, or personal visual observation, such as satellite imagery or aerial photography.

GLOSSARY (cont.)

Sere - the series of stages occurring in succession in animal and plant communities until the climax is reached.

Stand - the smallest continuous aggregation of plants, generally trees, which is homogeneous in composition and structure.

Stratification - (see classification).

Subregional Application - within one state or portion thereof.

Succession - the replacement of one community stage by another.

System - a method or plan of classification or arrangement.

Terrestrial - pertaining to land ecological systems.

Transect - a line through a community along which characteristics of a community are sampled or observed.

Understory - the vegetation layer between the canopy and ground cover (see overstory).

Vegetation - the plants living within a specified area.

Vegetation Type - a specified plant community or association.

Vegetative Cover - the entire plant cover of an area.

Wetlands - land areas containing high quantities of soil moisture, where the water table is at or near the surface throughout most of the year. Usually characterized by the presence of hydrophytic plants and hydric soils.

Wildlife - undomesticated animals; usually applied to non-aquatic vertebrates.

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KEYWORD INDEX[1]

KEYWORDS	MULTIREGIONAL SYSTEMS (Section I)	SUB-REGIONAL SYSTEMS (Section II)	CANADIAN SYSTEMS (Section III)
Agriculture (Capability for)	015	603	9001
Climate	004, 005	902	9003, 9004
Computer Use	003, 007	101, 404, 601 1202, 1402, 1501, 1503, 1606	9002
Forests	001, 016, 018	202, 302, 602 704, 1001, 1202, 1203, 1501, 1503, 1505, 1601	9005
Ground Survey	015	302, 305, 401, 403, 502, 704, 705, 1502	
Land Capability	002, 005, 010, 015	503, 504, 506, 603, 703, 801, 1604	9001
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KEYWORD INDEX (continued)

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Existing/Potential (climax)	002, 003, 007, 008, 009, 010, 018	704, 705, 1203, 1301, 1603	
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[1] See page 2 for explanation of numbering system for classification system descriptions.

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AREA	LAND CAPABILITY/ SUITABILITY	LAND USE/ COVER	LAND FORM	SOILS	VEGETATION	WILDLIFE
NATIONAL	005,010,015	002,006, 012,013, 014	002,004, 009,017	002,004, 005,006, 008	001,002,003, 004,007,008, 009,010,011, 016,017,018, 019	009,011, 019
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ARIZONA					201,202	
CALIFORNIA		303		301	301,302,304, 305	
COLORADO		403			401,402	402,404
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KANSAS	603	601			602	601
MONTANA	703	701			702,704,705	702
NEVADA	801					
NEW MEXICO		901	901	902	901	
NO. DAKOTA					1001,1002	
OREGON	1103	1103	1101		1101,1102	
SO. DAKOTA		1201,1203			1202,1203	1201
TEXAS					1301	1301
UTAH		1402	1402	1402	1401,1402	1401,1402
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